

1. EXECUTIVE SUMMARY

1.1 WHAT IS THE GREEN LINE?

The Green Line, when built, will be a 14-mile elevated Monorail line in Seattle, Washington, with up to 19 stations. It will serve a number of communities and destinations within Seattle, including Ballard, Interbay, Magnolia, Queen Anne, Seattle Center, Key Arena, Belltown, the Downtown retail core, Pike Place Market, Ferry Terminal, Pioneer Square, Chinatown International District, Seahawks Stadium, Safeco Field, South Downtown (SODO), and West Seattle. Figure 1-1 shows the general route for the Green Line and the alternatives for the specific locations of Monorail stations and guideways that have been studied in this Final Environmental Impact Statement (EIS). The Green Line will travel primarily along the public right-of-way. It was approved by Seattle voters as a fast, affordable alternative to traffic and long commutes. As planned, the Green Line will carry millions of people every year in clean, electric-powered trains that connect key Seattle destinations in a matter of minutes.

1.2 WHO WILL BUILD THE GREEN LINE?

The Seattle Popular Monorail Authority (Seattle Monorail Project or SMP) will build and operate the Green Line. SMP was created by Seattle voters in November 2002 following the adoption of the Seattle Popular Monorail Plan. SMP is governed by a nine-member Board of Directors, two of whom are directly elected, and the remainder of whom are appointed by the Mayor, Seattle City Council, or the SMP Board. The Board also has a tenth, ex officio member, who is a State Legislator. SMP is a city transportation authority and a municipal corporation created under state law (RCW Ch. 35.95A).

1.3 WHY IS THE GREEN LINE PROPOSED?

The Green Line is being built to implement the Seattle Popular Monorail Plan (the Plan) that was approved by Seattle voters in November 2002. Seattle voters, through citizens' initiatives in 1997 and 2000, asked that a plan for a citywide Monorail system be developed. The 2002 vote approved the Plan and provided funding to build and start operations of the Green Line.

Seattle has a long history with Monorail. The existing Seattle Center Monorail has been a part of civic life and public transit in the city since 1962. An extended Monorail system was proposed in the 1990s to meet the need for high-quality, clean-powered, and reliable public transportation in an area of the city that has been identified as a transit priority corridor by the City of Seattle. Monorail technology, which is elevated above traffic on its own dedicated guideway, would give passengers a comfortable and efficient mobility option with excellent connections to other modes of transportation, including foot, bus, bicycle, light rail, commuter rail, ferry, and auto.

Planning for a Seattle Monorail system as an alternative to traffic congestion began in the mid 1990s as a grassroots citizens' effort. Initiative 41, which was approved by Seattle voters in 1997, created the Elevated Transportation Company (ETC), a public development authority, to develop a Monorail plan for the city. Initiative 53, passed by voters in 2000, gave the ETC \$6 million and required the organization to submit a plan to voters within two years to design and build a Monorail system.

The ETC selected five corridors that would be appropriate for a citywide Monorail system based on the City of Seattle's Intermediate Capacity Transit Study and comments from hundreds of citizens at public meetings. The ETC specifically identified the Green Line as the first Monorail line to be built.

**Figure 1-1
Seattle Monorail Project
Green Line Corridor
Project Area**

Alternatives By Segment

Segment 1: Ballard

- 1.1 - West Side of 15th
- 1.1(s) - West Side of 15th with Single Beam
- 1.2 - Center of 15th/East Bridge

Segment 2: Interbay

- 2.1 - West Side of 15th/Center of Elliott
- 2.1(s) - West Side of 15th/Center of Elliott with Single Beam
- 2.2 - Center of 15th/West Side of Elliott

Segment 3: Queen Anne/Seattle Center/Belltown

- 3.1 - Seattle Center/Republican
- 3.2 - Mercer
- 3.3 - Thomas
- 3.5 - Second/Denny

Segment 4: Downtown

- 4.1 - West Side of Second
- 4.2 - East Side of Second with Crossover
- 4.3 - Center of Second
- 4.4 - East Center of Second

Segment 5: SODO

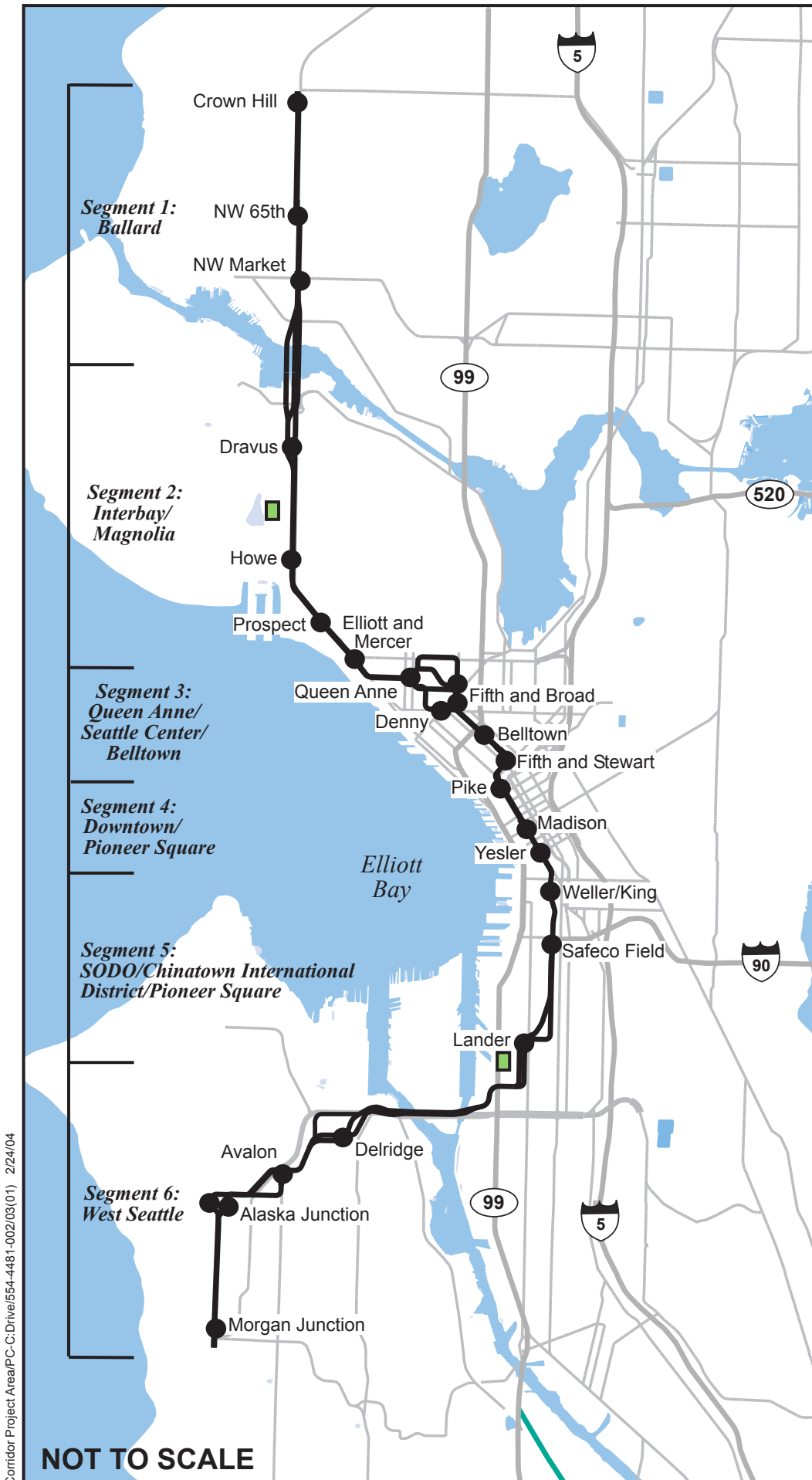
- 5.1 - East side of Third/Utah
- 5.2(s) - West Side of Third/Utah with Single Beam
- 5.2 - West side of Third/Utah

Segment 6: West Seattle

- 6.1 - West Seattle I
- 6.2 - West Seattle II
- 6.3(s) - Delridge North with Single Beam
- 6.4 - West Seattle Andover/Yancy Subsegment
- 6.4(s) - Andover/Yancy with Single Beam
- 6.5 - Genesee Subsegment

Note: Segment Preferred Alternatives are illustrated in Figures 1-2 through 1-6

- Station Vicinities
- Operations Center Alternatives



NOT TO SCALE

In April 2002, the ETC published a Draft Programmatic EIS under the Washington State Environmental Policy Act (SEPA) and a Draft Seattle Popular Monorail Plan, both of which evaluated a number of route alternatives for the Green Line. The ETC selected a 'most promising' route for the Green Line in June 2002, released the Final Programmatic EIS in July, and adopted the proposed route and station vicinities for the Green Line in August through the Seattle Popular Monorail Plan.

The Seattle Popular Monorail Plan was approved by Seattle voters in November 2002 through Citizens' Petition #1. This vote created SMP, required SMP to implement the Plan, and provided funding through a Motor Vehicle Excise Tax for design, construction, and startup operations of the Green Line. No federal funding is being proposed for the Green Line.

Since its creation following the November 2002 vote, SMP has been working to move forward with the development of the Green Line. To accomplish this, the SMP Board has adopted six goals, committing to build the Green Line:

- On time;
- Under budget;
- With break-even operations;
- With excellent design;
- True to its grassroots heritage; and
- With transparency and accountability to the public.

1.4 WHAT DOES THIS EIS DO?

The voter-approved Monorail Plan included a general route and station vicinities for the Green Line. This Final EIS evaluates a number of alternatives consistent with the Plan for the specific alignments (the exact route) the Green Line would follow and specific locations for Monorail stations. The EIS also evaluates alternative station types, guideway beam configurations, and features and locations of other Monorail facilities, including an Operations Center, traction power substations, and special structures such as bridges. Finally, it evaluates a No Action Alternative. This EIS has been prepared under both SEPA and the National Environmental Policy Act (NEPA).

This Final EIS provides updates, clarifications, and further analysis to a Draft EIS that was released by SMP and the U.S. Coast Guard on August 29, 2003. The Final EIS includes a number of components contained in seven volumes:

- Volume 1A contains Chapters 1, 2, 3 and 4, which provide updated text (and figures and maps as needed) for each substantive section of the Draft EIS, present analysis of updated and refined alternatives, and present a Preferred Alternative, which is the SMP staff's recommendation for the Green Line's alignment and station locations (also called the Final Staff Recommendation or FSR).
- Chapter 5, also located in Volume 1A, presents a Mitigation Program that discusses the potential mitigation measures that were identified for all alternatives that were evaluated and proposes a set of mitigation measures for the Preferred Alternative.
- Chapter 6, also in Volume 1A, presents a summary of the comments that were received from members of the public, businesses, community organizations, and federal, state, and local agencies. All comments received, as well as responses to those comments, can be found in Volumes Five and Six.

- Volumes 1B, 2, 3, and 4 contain EIS Appendices that supplement appendices from the Draft EIS to provide updated and refined drawings, maps, and technical information and, in addition, present background information on the single beam configuration, updated design drawings, and updated visual simulations showing areas of the Preferred Alternative to supplement the simulations that were presented in the Draft EIS.
- Volumes 5 and 6 present comments received on the Draft EIS and response to those comments.

SMP only has authority and funding to construct a Monorail that is consistent with the Green Line as described in the Plan and approved by the voters. For this reason, the alternatives evaluated in the Green Line EIS were selected based on their ability to conform to the voter-approved Plan and compared with a No Action Alternative. Potential alternatives that did not conform with the voter-approved Plan's description of the Green Line, including those that suggested other technologies, other routes, or other transportation system improvements, were not evaluated in this EIS, as any deviation from the Green Line as described in the Seattle Popular Monorail Plan would require voter approval.

Because the Green Line will cross over two waterways along its route—the Lake Washington Ship Canal and the Duwamish Waterway—the EIS has been prepared jointly with the U. S. Coast Guard, which will determine whether to issue bridge permits as required for the Green Line's water crossings. The Coast Guard determined that the scope of its NEPA review should include the entire 14-mile Green Line, so that all indirect or cumulative effects of its permitting actions can be fully considered. This EIS is also intended to meet the Coast Guard's obligations to evaluate potential impacts on historical resources under Section 106 of the National Historic Preservation Act, as well as other federal regulations.

1.5 HOW HAS THE EIS BEEN PREPARED?

Work on this EIS began in January 2003 with a scoping process organized by SMP and the U.S. Coast Guard that included six public workshops (attended by over 1,700 people), an agency scoping meeting, and many small group and individual meetings, and attracted over 7,000 comments. Following the scoping process, SMP and the Coast Guard developed a set of reasonable alternatives for alignment and station locations, which were then analyzed by technical experts for different areas of the environment. Engineering, design, and operational studies were conducted as the environmental analysis proceeded.

A Draft EIS was released in August 2003, and SMP and the Coast Guard sponsored a 45-day comment period from August 29th through October 14th that attracted over 3,000 comments via letter, email, and testimony at a public hearing that was held on September 29, 2003. Throughout the comment period, SMP staff presented and discussed the Draft EIS with members of the public. More information about SMP's public involvement efforts can be found in Appendix DD.

Comments received on the Draft EIS in some cases prompted additional analysis, as well as new, updated, or refined alternatives for review. That additional analysis has been included in this Final EIS. Following the release of this Final EIS, the SMP Board will deliberate on and then determine an alignment and station locations for the Green Line and the Coast Guard will begin its consideration of the permits needed for the Green Line. Other permitting and regulatory agencies, including the City of Seattle, will begin their formal review of the project.

1.6 WHAT COMMENTS DID SMP RECEIVE ON THE DRAFT EIS?

SMP received 460 public and agency letters, e-mails, and oral testimonies on the Green Line Draft EIS during the 45-day public comment period from August 29 to October 14, 2003. These letters and testimonies contained a total of 3,369 separate comments.

Written and oral comments were received from individuals; community groups; institutions; non-profit organizations; businesses; the City of Seattle; and federal, state, regional, and local agencies during the comment period. A public hearing on the Green Line Draft EIS was held on September 29, 2003 in the Seattle Center Northwest Rooms.

The comments were reviewed and categorized based on their subject matter, and SMP staff prepared responses in consultation with technical experts. In some cases, comments led SMP to undertake additional analysis or to study new, refined, or updated alternatives for the Green Line for inclusion in this Final EIS. All comments and responses are part of the Final EIS and will be considered by decision-makers, including the SMP Board of Directors.

Comments were received on a range of subjects including all areas of the environment. A number of people wrote regarding route selection, with the largest number focused on in the Seattle Center, Third Avenue S, and the Delridge and Avalon areas of West Seattle. Frequent topics were land use and neighborhoods, parking and traffic; property displacements and relocation; access to stations; coordination with other agencies and projects; and cultural resources. A summary of comments can be found in Chapter 6. The full text of all comments received and responses to the comments can be found in Volumes Five and Six.

The U.S. Environmental Protection Agency (EPA) formally rates Draft Environmental Impact Statements as part of its responsibilities under NEPA and Section 309 of the Clean Air Act. EPA gave the Green Line Draft EIS its highest rating, "Lack of Objections." EPA's letter and rating system is included at the start of this volume. EPA stated, "[w]e strongly support the project purpose and need to provide a safe and reliable mass transit alternative to travel on congested city streets and highways and to better link the Seattle neighborhoods through which the proposed monorail passes."

1.7 WHAT ARE KEY ELEMENTS OF THE GREEN LINE?

A monorail is a type of elevated railway in which train cars travel along a single rectangular beam. The trains are guided by rubber tires against the beam and propelled by electric motors. Green Line trains would be automated and would not require drivers. In addition to the trains, the Green Line would include a number of components, all of which have been studied in this EIS. These components are described in more detail in Chapter 3, Project Description and Alternatives, and in the Glossary (Appendix KK). Visualizations of key features and alternatives are also presented in Appendix M, Visual Simulations, of the Draft EIS and Appendix MM, Updated Visual Simulations, of this Final EIS. Key components include:

Stations. The Green Line will have up to 19 stations along its route. In addition to analyzing alternative locations for these stations, the EIS also evaluates the type of station that could be built at each location. Based on the height and orientation of the guideway at any station location, as well as the surrounding streetscape and neighborhood characteristics, one of seven station types could be built: center platform, center platform with mezzanine, side platform, side platform with mezzanine, vertical, event/turnback, and terminus. Any of these station types can be built as an elevator station with high-speed, glass elevators providing primary passenger vertical circulation. Elevator stations can be more compact than other types of stations. Future projects are possible at Green Line stations. In the event future projects are proposed, environmental review would be conducted separately for those projects as needed.

Guideway beams. The Green Line will travel on guideway beams supported by columns and other structures. The guideways will also house other systems elements, such as the electrical transmission components needed to power the trains. Monorail guideway beams can be arranged horizontally or

vertically, and both of these configurations are studied in this EIS. The height of the guideway from the ground will vary in different locations, depending on topography, the need to maintain consistent grades, and other factors. The minimum height would be based on clearance for vehicles in the roadway below and City standards, which would range from approximately 18 to 22 feet. Guideway height for bridges or other special structures would be based on site conditions and requirements, such as those for navigation clearance. All Green Line alternatives evaluated in the Draft EIS were a dual-beam configuration, with separate northbound and southbound guideways for the entire 14-mile system. In the Final EIS, the feasibility of using a single beam configuration in several areas has been evaluated in response to comments. Under a single beam scenario, northbound and southbound trains would alternate use of a single guideway and use stations and areas of dual beam guideway to pass trains going in the opposite direction. For more information on the single beam configuration, please see Appendix LL.

Guideway columns. The Green Line's guideway beams will be supported by columns and other support structures. Columns can typically be located from 60 to 150 feet apart without requiring special structures. The specific locations of these columns may be varied within this range because of soil or seismic conditions; to minimize impacts on properties, utilities, or transportation facilities; to accommodate sightlines, sidewalk widths, or a streetscape's architectural form; or to avoid being placed in front of a loading dock, driveway, or building entrance. Special supports—such as offset columns or bent structures—could be used to support the guideway beams when long clear spans, curves, or cantilevered support systems are required, such as when the guideway curves or passes diagonally across a street or intersection, or where a column location must be close to a building. Columns will range from about three to four feet in diameter for standard columns to 12 feet in diameter for bridge and special structure supports, depending on geotechnical and soil conditions, the height of the guideway, the length of the span between columns, whether the column is supporting a single beam or dual beams, and whether the beams are positioned directly over the column or are supported with a special structure.

Operations Center. The Green Line will require an Operations Center for train maintenance and control functions. Potential locations for an Operations Center in the Interbay and SODO industrial areas are evaluated in this EIS. The Operations Center is anticipated to be located on approximately seven to ten acres of land and would house technical and maintenance functions, including the Green Line's computerized command and control center, a train storage yard, train vehicle wash, repair shops, work bays, and offices. In addition, the Operations Center could be used as a staging area for Green Line construction and as administrative headquarters for SMP. Most train storage would occur at the Operations Center site, although train storage could occur at tail tracks at the north and south ends of the line or at pocket tracks near event stations, or, potentially, at a separate train storage facility in the SODO industrial area that is evaluated in this EIS. While the system is shut down overnight, train storage could occur on the line at or near stations.

Other facilities. The Green Line will also require other, smaller facilities such as switches, tail tracks, pocket tracks, traction power substations, and train storage facilities. Potential locations for these facilities are noted as possible with the alignment and station alternatives, although in some cases, specific locations would not be confirmed until detailed design of a selected alignment alternative has been undertaken.

1.8 HOW WILL THE GREEN LINE BE CONSTRUCTED?

The first portion of the Green Line will open on December 15, 2007. Green Line construction is expected to begin in 2005 and to continue until the end of 2009. The initial section that will open in 2007 is planned to be operated while construction of the entire line is being completed. There is no plan to

operate a shorter than full-length system for any significant period, and construction is planned for a continuous period.

Construction activities in any of the six geographic segments would be intermittent over a total period of approximately 24 months. In some areas, utility relocation could require more time. Construction activities may occur on a 24-hour basis, although the intensity and type of activities that occur could be adjusted to avoid or minimize adverse impacts and to meet permit and regulatory requirements. A work-specific construction plan would be developed to establish the limits for construction, its estimated schedule and duration, construction approaches, and appropriate sequencing. Where possible, construction activities would be coordinated with other capital improvement projects to help minimize construction impacts. Construction activities would meet the requirements established in the construction permits.

The major components of the Green Line to be constructed are the guideways (including bridges and special structures), the stations, and the Operations Center. The overall construction period would include a period of construction during which site preparation, utility relocation, primary construction, and finish construction would take place, followed by a period of system installation, integration, and testing. During construction, work areas would be secured using methods such as pedestrian and vehicle traffic barriers, flagging, and security fencing. The construction of the Green Line is discussed in more detail in Section 4.17, Construction, and Appendix X, Construction Backup Information of the Draft EIS.

SMP is currently working on the procurement process that will select a contractor team to design, build, operate, and maintain (DBOM) the Green Line. In mid-2003, SMP completed a selection process that resulted in two teams, Cascadia Monorail Company and Team Monorail, being identified as qualified to submit specific proposals. The procurement process continued with the release of a Draft Request for Proposals issued for industry and public review in December 2003, and a Final Request for Proposals in February 2004. This Final EIS will be included in an addendum to the RFP along with the SMP Board's final decision on alignment and location of stations and other major facilities. Because the two competing teams use different monorail technologies with different cars, guideway beams, switches, and other components, the selection process will be completed before final design work is done on the Green Line's alignment and station locations. This EIS was conducted with conservative analysis that would apply to either team's technology. The selected DBOM contractor will be responsible for implementing many of the mitigation measures outlined in Chapter 5, Mitigation Program, under SMP's direction and control.

1.9 HOW WILL THE GREEN LINE BE OPERATED?

SMP has developed preliminary operating requirements for the Green Line, which are used in this EIS to depict the key characteristics of the Green Line's operations plan, including the expected schedules, hours of operation, passenger capacities, and travel times for the Green Line. The environmental analysis is based on a conservative range of potential full-system operations.

The Green Line is currently projected to operate up to 19 hours a day, 365 days a year, with passenger service beginning at 5:00 a.m. each day and ending at midnight. Peak service would likely be offered weekday mornings from 6:00 to 9:00 a.m. and weekday evenings from 4:00 to 7:00 p.m. Other periods would offer off-peak service, although event service may operate at or near peak levels before and after a scheduled event. Upon full system opening, trains are expected to run about every four to six minutes in each direction during peak periods, accommodating approximately 2,000 to 3,000 passengers per hour per direction.

Green Line trains are expected to complete the 14-mile route in approximately 30 to 40 minutes, with an average travel speed of between 20 to 25 miles per hour, including changes in speed as trains approach

and leave stations. The average travel speed also includes a typical time stopped at a station of 20 seconds for passenger loading and unloading, although individual stations could have times ranging from between 10 to 120 seconds depending on passenger loads and system operating and schedule needs. Between stations, the trains could travel up to a maximum speed of about 50 miles per hour.

1.10 WHAT ALTERNATIVES FOR THE GREEN LINE ARE STUDIED IN THE EIS?

To make it easier to evaluate and compare different alignment and station alternatives, the analysis in this EIS is divided into six geographic segments, from north to south (see Figure 1.1):

Segment One: Ballard Segment - From NW 85th Street to south of the Lake Washington Ship Canal.

Segment Two: Interbay/Magnolia Segment - South of the Lake Washington Ship Canal to W Harrison Street in southwest Queen Anne.

Segment Three: Queen Anne/Seattle Center/Belltown Segment - From W Harrison Street to the Seattle Center area and along Fifth Avenue in Belltown to Lenora Street.

Segment Four: Downtown/Pioneer Square Segment - From Lenora Street to S Jackson Street at King Street Station.

Segment Five: SODO/Chinatown International District/Pioneer Square Segment - From King Street Station to S Horton Street.

Segment Six: West Seattle Segment - From S Horton Street over State Route (SR) 99 to the Alaska Junction and then along California Avenue SW to the Morgan Junction.

Within each of these six geographic segments, the EIS analyzes a number of alternatives for alignments and stations based on public comments and the results of initial design, engineering, and operational studies. The EIS also evaluates a No Action Alternative.

In the descriptions of alignment and station alternatives in this Executive Summary and in Chapter 3, and in the analysis of different issues in Chapter 4, Green Line alignment and station alternatives are packaged together into segment- and system-wide groupings, including a Preferred Alternative, to make them easier to analyze. However, these packages are interchangeable, and the Green Line may ultimately be constructed using a combination of alignments, stations, and other features that contain elements from different alternatives, as well as options with similar environmental impacts to the alternatives specifically analyzed in the EIS. A station may or may not be built at any specific alternative location. For each station location considered, SMP may ultimately choose to select one of the alternative locations and station types; select a location and station type with similar environmental impacts to those specifically considered; construct the guideway so as to allow for construction of a future station; or determine not to build a station. In order to assess impacts, the estimated size of station alternatives in the EIS is conservatively large, and final design of stations could result in smaller footprints.

Table 1-1 summarizes each of the alignment and station alternatives that were evaluated and indicates the Preferred Alternative for each area. Chapter 3 provides a detailed description of each alternative. Figures 1-2 to 1-6 depict the location of the alternatives by geographic segment. The engineering and architectural conceptual designs that were developed for the purpose of the EIS analysis are included in Appendix L of the Draft EIS and Appendix LL of this Final EIS.

1.11 HOW WAS THE PREFERRED ALTERNATIVE DEVELOPED?

This EIS presents a Preferred Alternative that has been developed, updated, and refined based on public comments as well as design, technical, engineering, and environmental studies.

- **EIS Scoping Process: January – February 2003.** To solicit public comments at the start of the EIS process, SMP and the U.S. Coast Guard invited community members and public agencies to public workshops and informational meetings. SMP received over 7,000 comments during its scoping period in January and February 2003 (all of which were reviewed by SMP and the U.S. Coast Guard) and attracted over 1,700 participants to a series of community workshops.

SMP also conducted urban design, engineering, and operational studies of different alignment and station alternatives along the voter-approved Green Line route, and used available environmental information, including information from the Seattle Popular Transit Plan Programmatic EIS and findings from initial environmental analysis to develop potential alternatives.

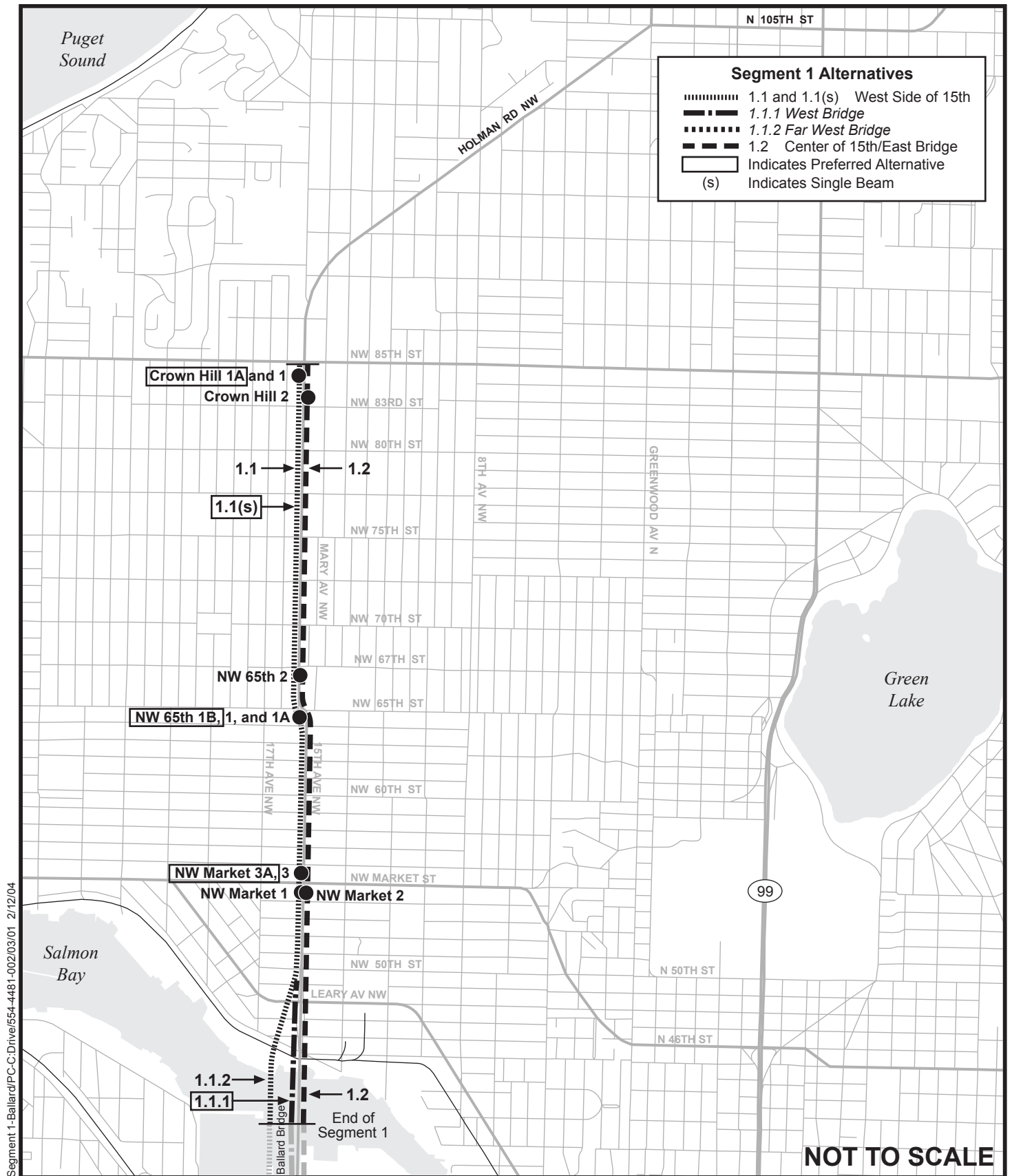
- **Preliminary Preferred Alternative: April 2003.** On April 2, 2003, SMP published a document entitled “Building the Monorail: Seattle Monorail Project Preferred Alternative.” This document contained the SMP staff recommendation for a Preliminary Preferred Alternative as of that date to help inform community members and agency partners. However, SMP did not designate a Preliminary Preferred Alternative in the Draft EIS. Instead, that early staff recommendation was published to solicit and focus public comment.
- **Draft EIS Alternatives Analysis: April – August 2003.** Based on public comment and a community involvement process that was conducted around the Preliminary Preferred Alternative, as well as additional technical and design work, SMP developed reasonable alternatives for inclusion in the Draft EIS. The Draft EIS examined alternatives that are consistent with the voter-approved Seattle Popular Monorail Plan. The alternatives it examined were organized into geographic segments for ease of analysis, although the Draft EIS noted that station and alignment alternatives that were presented in the Draft EIS could be ‘mixed and matched’ as desired.

Numerous other alignment and station alternatives in addition to those analyzed in the Draft EIS were considered during the scoping process. Alternatives that were considered but not carried forward for further detailed evaluation in this EIS were discussed in Appendix B of the Draft EIS. That appendix also described the reasons for not carrying forward these alternatives, which include inconsistency with the Seattle Popular Monorail Plan and the purpose and need of the Project, technical and economic infeasibility, environmental impacts, and similar or identical impacts to alternatives included in the Draft EIS.

- **Draft EIS Comment Period: August – October 2003.** After the publication of the Draft EIS, SMP and the U.S. Coast Guard held a 45-day public comment period, which extended from August 29 through October 14, 2003. This public comment period included a public hearing, which was held on September 29, 2003 at the Northwest Rooms at Seattle Center. SMP and the U.S. Coast Guard received 3,369 written or spoken comments during this period.
- **Preliminary Staff Recommendation: November 2003.** In response to comments received following the publication of the Draft EIS, SMP conducted additional engineering and design work, and developed a number of updates and refinements to the alignment and station location alternatives for inclusion in the Final EIS. In addition, to provide focus for continued community involvement, SMP staff published a “Preliminary Staff Recommendation” on November 18, 2003. That Preliminary Staff Recommendation summarized SMP staff’s preliminary preferred alternative at that time and was presented at two city-wide open houses on November 18 and 19, 2003, which were attended by over 2,000 people.

- **Final Staff Recommendation and EIS Preferred Alternative: January 2004.** Based on comments received at the November open houses, as well as continuing engineering and design work, SMP staff presented a recommendation for Green Line alignment and station locations to the SMP Board in January 2004. That recommendation is designated as the **Preferred Alternative** for this EIS. It consists of components from the range of alternatives that were analyzed in the Draft EIS, including a number of updates and refinements that were developed in response to public comment.

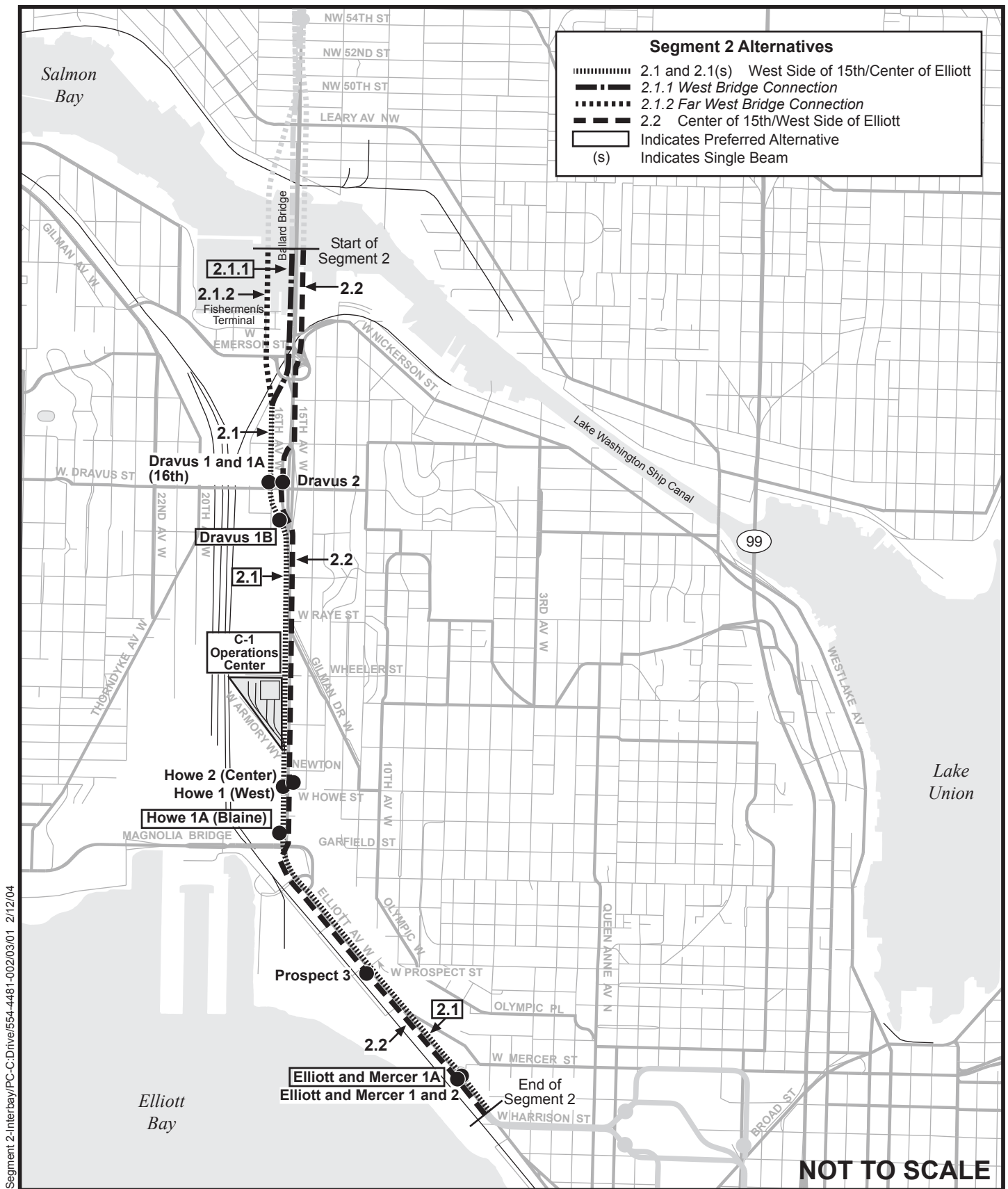
The Preferred Alternative does not reflect SMP Board or U.S. Coast Guard action. Instead, it is presented to designate SMP staff's recommendation. All other alternatives that were analyzed in the Draft EIS, as well as the additional updates and clarifications prepared in response to comments, are also carried forward in this Final EIS, and are analyzed at the same level of detail as the Preferred Alternative. More detail is provided on mitigation measures that would be implemented based on the adoption of the Preferred Alternative. A broad range of potential mitigation measures was identified in the EIS, and specific measures were selected for the Preferred Alternative and are discussed in Chapter 5.



Segment 1-Ballard/PC-C:/Drive/554-4481-002/03/01 2/12/04



**Figure 1-2
Segment 1: Ballard**



Segment 2-Interbay/PC-C:Drive/654-4481-002/03/01 2/12/04



Figure 1-3
Segment 2: Interbay/Magnolia

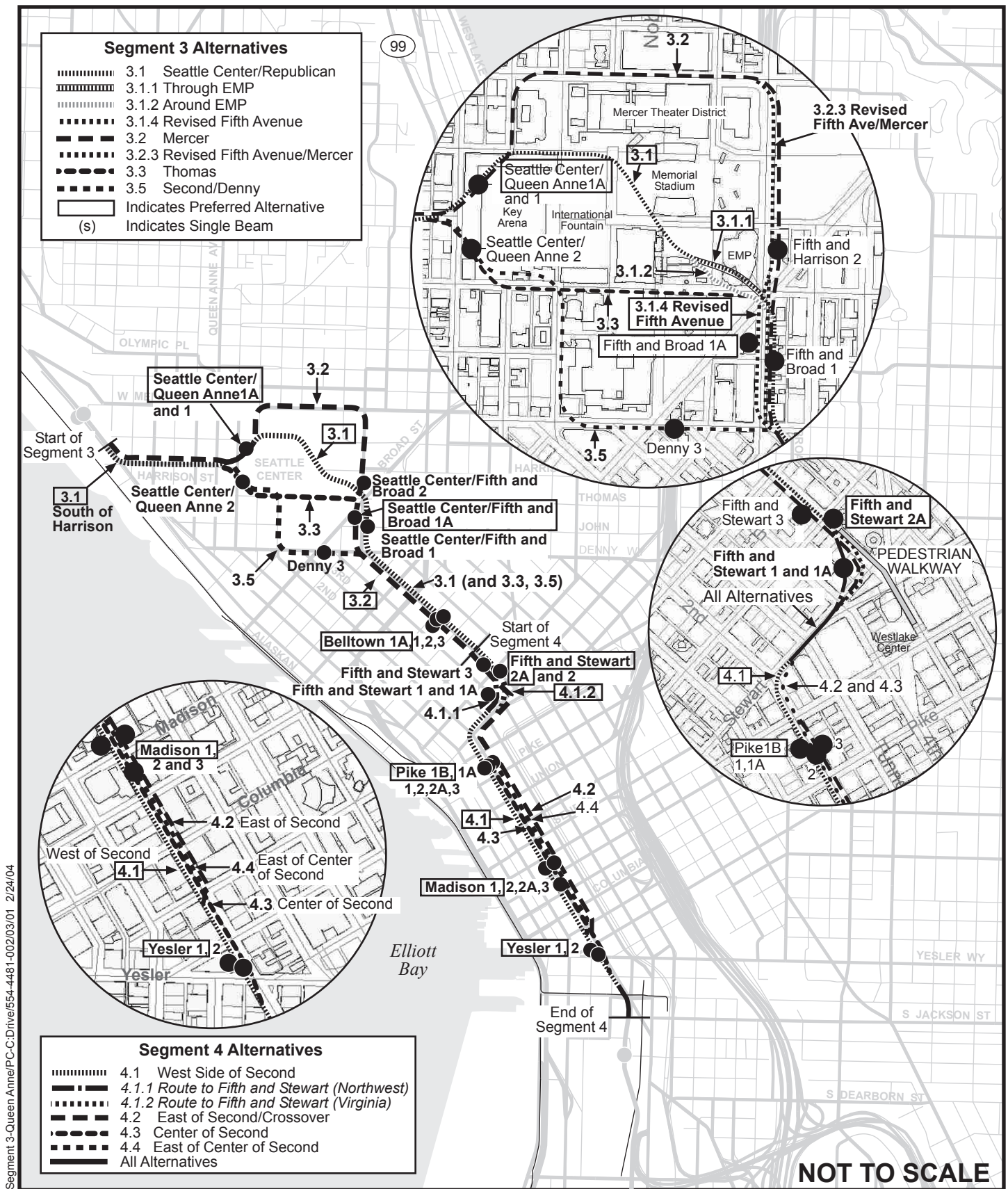


Figure 1-4
Segments 3 and 4: Queen Anne/
Seattle Center/Belltown and
Downtown/Pioneer Square

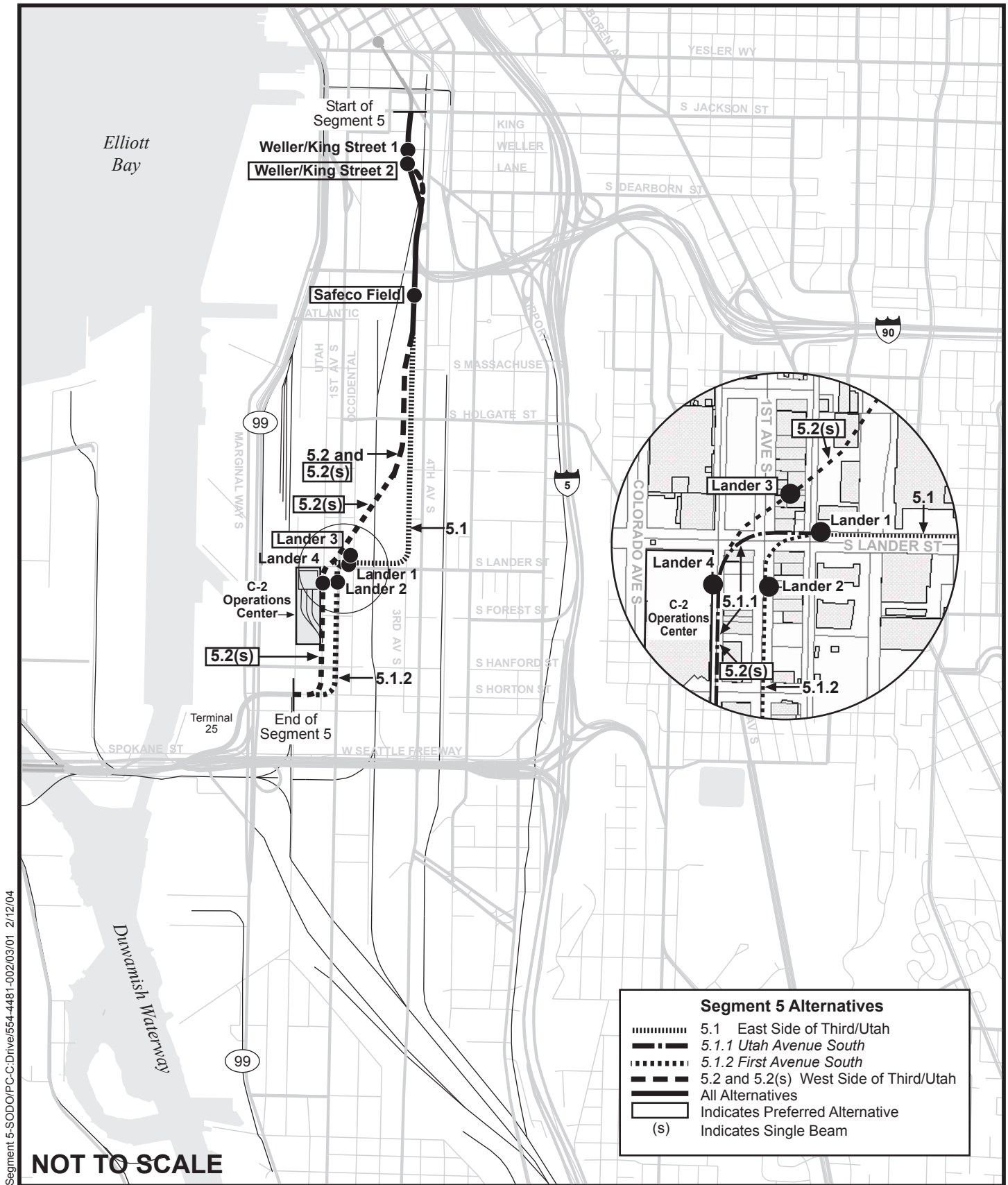


Figure 1-5
Segment 5: SODO/Chinatown
International District/Pioneer Square

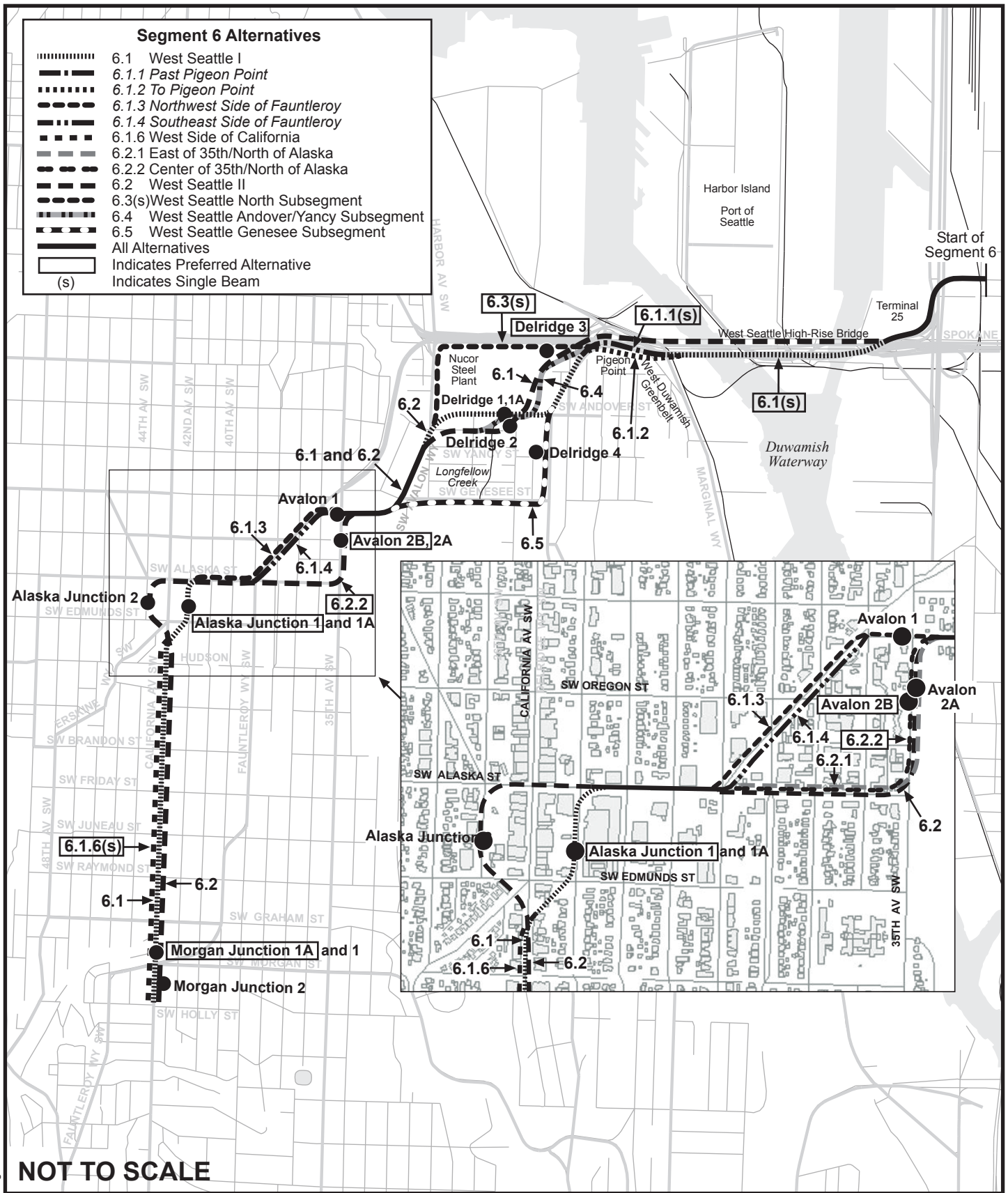


Figure 1-6
Segment 6: West Seattle

Table 1-1. Summary of Green Line Alignment Alternatives

Alternative Number/Name	Key Features
Segment 1: Ballard	<i>See Figure 1-2 for an area depiction and Chapter 3 for more detail.</i>
1.1 – West Side of 15 th	From NW 85 th Street along west side of 15 th Avenue NW, to a new bridge over the Ship Canal on the west side of the existing Ballard Bridge. Columns for the alignment would be placed in the existing southbound a.m. peak travel/parking lane of 15 th Avenue NW. A dual beam configuration is evaluated throughout this segment. The stations evaluated with this alternative include Crown Hill 1 or 1A (West, 85 th), NW 65 th 1 or 1A (West), and NW Market 1 (Southwest) or 3 (Northwest).
1.1(s) – West Side of 15 th with single beam	A single beam configuration for a west side of 15 th Avenue NW alignment alternative north of NW Market Street with a horizontal dual beam passing area at the NW 65 th Street Station, and a dual beam vertical configuration at the NW Market Station. The stations evaluated with this alternative are Crown Hill 1A (West, 85 th), NW 65 th 1B (West), and NW Market 3A (Northwest).
1.2 – Center of 15 th	From NW 85 th Street, along the center of 15 th Avenue NW (occupying the center two-way turn lane) to about NW 51 st Street, then east of 15 th Avenue NW to a new bridge (also referred to as Alternative 1.2) over the Ship Canal east of the existing Ballard Bridge. A horizontal dual beam configuration is studied throughout. The stations evaluated with this alternative are Crown Hill 2 (Center), NW 65 th 2 (Center), and NW Market 2 (Center).
Ballard Crossing	The EIS analyzes four alternatives for a Monorail-only bridge to be constructed over the Lake Washington Ship Canal. All bridge alternatives could be designed as box girder, arch, or cable-stayed structures: • Alternative 1.1.1 (West Bridge) would be a horizontal dual beam configuration just west of the existing Ballard Bridge. • Alternative 1.1.2 (Far West Bridge) would be a horizontal dual beam configuration approximately 200 feet west of the existing Ballard Bridge. • Alternative 1.1.1(s) (West single beam Bridge) would be a single beam box girder configuration 40 to 50 feet west of the existing Ballard Bridge. • Alternative 1.2 (East Bridge) would be a horizontal dual beam configuration located east of the existing Ballard Bridge.
Ballard Preferred Alternative	The Preferred Alternative for Ballard is Alternative 1.1(s), which would be a single beam configuration along the west side of 15th Avenue NW. It would include dual beam passing areas at the NW 65th and NW Market Stations. It would travel to the Alternative 1.1.1 West Bridge, which would have a dual beam horizontal configuration on a box girder type bridge. The stations for the Preferred Alternative are Crown Hill 1A (West, 85th), NW 65th 1B (West), and Market 3A (Northwest).

Table 1-1. Summary of Green Line Alignment Alternatives (continued)

Alternative Number/Name	Key Features
Segment 2: Interbay/Magnolia	See Figure 1-3 for an area depiction and Chapter 3 for more detail.
2.1 – West Side of 15 th / Center of Elliott	From the new bridge west of the Ballard Bridge over the Port of Seattle Fishermen's Terminal to the west side of 16th Avenue W and W Dravus Street, then continuing along the west side of 15th Avenue W, over the Galer Flyover and Magnolia Bridge to the center of Elliott, occupying the existing two-way left turn lane. The alignment would connect from the Ship Canal Bridge in one of two ways depending on which bridge alternative is selected: • Alternative 2.1.1, West Bridge Connection; or • Alternative 2.1.2, Far West Connection Stations evaluated with Alternative 2.1 are Dravus 1, 1A (16th) and 1B (Barrett), Howe 1 (West) and 1A (Blaine), and Elliott and Mercer 1 and 1A (Center). The guideways would be horizontally arranged except when approaching the stations at W Dravus Street and W Mercer Street where a vertical arrangement could be used depending on the station alternative selected. A dual beam configuration is evaluated throughout.
2.1(s) – West Side of 15 th /Center of Elliott with single beam	An alignment along the west side of 16th Avenue W and 15th Avenue W and the center of Elliott Avenue W with a single beam configuration north of the Elliott and Mercer Station and horizontal dual beam passing areas at the Dravus and Howe/Blaine Stations. Stations evaluated with Alternative 2.1(s) are Dravus 1B (Barrett), Howe 1A (Blaine) and Elliott and Mercer 1A (Center).
2.2 – Center of 15 th / West Side of Elliott	From the new bridge east of the Ballard Bridge to 15th Avenue W and W Dravus Street, then crossing to the center of 15th Avenue W, occupying the existing two-way left turn lane, then crossing west over the W Garfield street overpass and continuing on the west side of Elliott Avenue W, occupying the existing southbound parking/a.m. peak travel lane. A dual beam horizontal configuration is evaluated throughout. Stations evaluated with Alternative 2.2 are Dravus 2 (15th), Howe 2 (Center) or Prospect 3 (West), and Elliott and Mercer 2 (West).
Interbay/Magnolia Preferred Alternative	The Preferred Alternative for Interbay is Alternative 2.1 on the west side of 16th Avenue W and 15th Avenue W and the center of Elliott Avenue W, with stations at Dravus and Elliott/Mercer, and with the guideway constructed in anticipation of a future station at Howe/Blaine. The Preferred Alternative includes an Operations Center west of 15th Avenue W near W Armory Way (Operations Center C-1). The Preferred Alternative Stations are Dravus 1B (15th), Howe 1A (Blaine; future station), and Elliott and Mercer 1A (Center).

Table 1-1. Summary of Green Line Alignment Alternatives (continued)

Alternative Number/Name	Key Features
Segment 3: Queen Anne/ Seattle Center/ Belltown	<i>See Figure 1-4 for an area depiction and Chapter 3 for more detail.</i>
W Harrison Street, from First Avenue N to Seattle Center	Two alignments along W Harrison Street are evaluated as part of the Segment 3 alternatives. Alternative 3.1 (Seattle Center/Republican): South side of W Harrison in an existing parking lane with a horizontal dual beam configuration. Alternative 3.2 (Mercer): North side of W Harrison in an existing parking lane with a horizontal dual beam configuration. Alternative 3.3 (Thomas): Same as Alternative 3.1. Alternative 3.5 (Second/Denny): Same as Alternative 3.1.
Seattle Center Area, First Avenue N to Fifth Avenue N/Denny Way	Four alignment alternatives are studied in the Seattle Center area, two through and two around the Center. All four would travel in a horizontal dual beam configuration throughout this area of the segment. Alternative 3.1 (Seattle Center/Republican): Crossing from W Harrison Street over First Avenue N to a station (Seattle Center/Queen Anne 1 or 1A; North) northwest of Key Arena, then following Republican Street past Memorial Stadium and the International Fountain (called the 'Northwest Route') through Seattle Center. In Seattle Center, there are two alternatives in the area of the Experience Music Project (EMP): • Alternative 3.1.1 would travel through the EMP • Alternative 3.1.2 would travel around the EMP The alignment continues over the east side of Fifth Avenue N to a station near Broad Street (Fifth and Broad 1; Southeast). Alternative 3.1.4 would travel over the center of Fifth Avenue N to the Fifth and Broad 1A Station. Alternative 3.2 (Mercer): From Seattle Center/Queen Anne 1 or 1A (North) Stations to the northwest of Key Arena to the west side of Warren Avenue N then to the north side of Mercer Street around Seattle Center. The original alignment would then travel along the east side of Fifth Avenue N to the Fifth and Broad 2 station. A revised alignment (Alternative 3.2.3) would separate the guideways to the east and west sides of Fifth Avenue N. to approach the Fifth and Broad 1A Station at Broad Street. Alternative 3.3 (Thomas): From a Seattle Center/Queen Anne 2 (South) Station, southwest of Key Arena, continuing east on Thomas Street through Seattle Center. The alignment would then travel over the center of Fifth Avenue N to a station at Broad Street (Fifth and Broad 1; Southeast) Alternative 3.5 (Second/Denny): From a Seattle Center/Queen Anne 2 (South) Station southwest of Key Arena, then following the west side of Second Avenue N, then crossing to the south side of Denny Way (using an existing travel lane), and proceeding along Denny to Fifth Avenue, with the Denny 3 Station near Fourth Avenue.

Table 1-1. Summary of Green Line Alignment Alternatives (continued)

Alternative Number/Name	Key Features
Fifth Avenue (from Denny Way to Virginia Street)	Two alignment alternatives are evaluated for Fifth Avenue in Belltown. Alternative 3.1 (Seattle Center/Republican): Along the center of Fifth Avenue in a vertical dual beam configuration. The station alternatives evaluated are Belltown 1, 1A (Center-West) or 2 (Center-East). Alternative 3.2 (Mercer): West side of Fifth Avenue in a horizontal dual beam configuration transitioning into a vertical configuration at a station (Belltown 1 or 1A; Center-West) or Belltown 3 (West) near Bell Street. This alignment alternative studied conditions along Fifth Avenue with and without the presence of the guideway beams and columns from the existing Seattle Center Monorail: • Alternative 3.2.1 would remove the existing Monorail • Alternative 3.2.2 would retain the existing Monorail Alternative 3.3 (Thomas): Same as Alternative 3.1. Alternative 3.5 (Denny): Same as Alternative 3.1.
Queen Anne/Seattle Center/Belltown Preferred Alternative	The Preferred Alternative for this area would travel along the south side of W Harrison Street (Alternative 3.1), through the Seattle Center on the path of Republican Street and through the EMP (Alternative 3.1.1), along the center of Fifth Avenue N (Alternative 3.1.4), and along the west of Fifth Avenue through Belltown with the existing Monorail guideways removed (Alternative 3.2.1). The Preferred Alternative Stations are Seattle Center/Queen Anne 1A (North), Seattle Center/Fifth and Broad 1A, and Belltown 1A (Center-West).

Table 1-1. Summary of Green Line Alignment Alternatives (continued)

Alternative Number/Name	Key Features
Segment 4: Downtown/Pioneer Square	<i>See Figure 1-4 for an area depiction and Chapter 3 for more detail.</i>
4.1 – West Side of Second	From Fifth Avenue, this alternative evaluates two options for turning west at Stewart Street: • Alternative 4.1.1 (Fifth and Stewart (Northwest)): A diagonal alignment across the block at the northwest corner of the intersection of Fifth Avenue and Stewart Street, serving Fifth and Stewart Stations 1 (Northwest) or 1A (West) • Alternative 4.1.2 (Fifth and Stewart (Virginia)): With a station near Virginia Street (Fifth and Stewart 2 (Virginia) or 2A (Virginia Center)) following Fifth Avenue until turning west south of the center of Stewart Street. From Stewart Street to Second Avenue, then proceeding south on the west side of Second Avenue in the existing bus and parking lane. Dual beam guideways would be horizontally arranged between stations and would transition in and out of a vertical configuration at stations. West-side alignment stations on Second Avenue are Pike 1A and 1B (West), Madison 1 (West), and Yesler 1 (West).
4.2 – East Side of Second with Crossover	From Fifth Avenue, turning west at Stewart Street, then proceeding south on the east side of Second Avenue, crossing to the west side of Second south of Marion Street. The columns would be in an existing parking lane on the east, and then in a bus and parking lane on the west. Dual beam guideways would be horizontally arranged in most locations. Stations evaluated are Fifth and Stewart 3 (Lenora), Pike 2 (East), Madison 2 (East) and Yesler 2 (Center).
4.3 – Center of Second	From Fifth Avenue, turning west at Stewart Street, then proceeding south in the center of Second Avenue. The guideway columns would occupy an existing travel lane, and dual beam guideways would be horizontally arranged in most locations. Stations evaluated are Fifth and Stewart 2 (Virginia), Pike 3 (Center), Madison 3 (Center) and Yesler 2 (Center).
4.4 – East of Center Option	From Fifth Avenue, turning west at Stewart Street to follow the south side of Stewart to Second Avenue, where the dual beams would be horizontally arranged and columns would occupy an existing travel lane (one lane east of the location of Alternative 4.3). South of Marion Street, the alignment would cross to the west side of Second and be vertically arranged, the same as Alternative 4.2. Stations evaluated are Fifth and Stewart 3 (Lenora), Pike 2A (East-Center), Madison 2A (East-Center) and Yesler 1 (West)
Downtown/Pioneer Square Preferred Alternative	The Preferred Alternative for Downtown is Alternative 4.1, along the west side of Second Avenue. It would feature the 4.1.2 (Virginia) transition from Fifth Avenue that allows for a west of center alignment along Fifth and the Fifth and Stewart 2A (Virginia Center) Station. Along Second Avenue, the dual guideways would transition between a vertical arrangement at stations and a horizontal arrangement between stations to minimize visual impacts. In addition to Fifth and Stewart 2A (Virginia Center), the stations are Pike 1B (West), Madison 1 (West), and Yesler 1 (West).

Table 1-1. Summary of Green Line Alignment Alternatives (continued)

Alternative Number/Name	Key Features
Segment 5: SODO/Chinatown International District/Pioneer Square	<i>See Figure 1-5 for an area depiction and Chapter 3 for more detail.</i>
5.1 – East Side of Third/Utah	Horizontally arranged dual beams following the east side of Third Avenue S (with columns in an existing parking area) to the north side of S Lander Street, then traveling south on one of two parallel streets: • Alternative 5.1.1 would travel along Utah Avenue S; with Lander 4 (Utah) • Alternative 5.1.2 would travel along First Avenue S; with Lander 2 (Southwest) The alignment would then travel west on the north side of S Horton Street. Stations evaluated for Alternative 5.1 are Weller/King Street 1 (Standard), Safeco Field 1, and Lander 1 (Northeast), 2 (Southwest) or 4 (Utah).
5.2 – West Side of Third/Utah	Following the west side of Third Avenue S in an existing parking area, turning southwest about a block north of S Lander Street to align with Utah Avenue S, and then west on the north side of S Horton Street. This alternative has been refined in response to comments to feature refined, shorter spans across the railroad tracks, a sharper diagonal alignment in the Lander area, and longer spans to allow for truck turning movement on Utah Avenue S and S Horton Street. Stations evaluated are Weller King Street 2 (Event) and Lander 3 (Diagonal).
5.2(s) – West Side of Third/Utah with single beam	This alternative would feature a horizontal dual beam configuration to serve stations at Weller/King and Safeco and then would follow the west side of Third Avenue S in an existing parking area in a single beam configuration. It would turn southwest about a block north of S Lander Street and would feature a dual beam passing area at Lander Station. It would then transition back to a single beam configuration to align with Utah Avenue S and travel to the north side of S Horton Street with a dual beam passing area near S Horton Street. Stations evaluated with the single beam section are Weller/King 2 (Event), Safeco 1 and Lander 3 (Diagonal).
SODO/Chinatown International District/Pioneer Square Preferred Alternative.	The Preferred Alternative for the SODO Segment is Alternative 5.2(s), which would follow the west side of Third Avenue S and travel diagonally near S Lander Street to the west side of Utah Avenue S to the north side of S Horton Street. It would feature single beam sections along Third Avenue S and Utah Avenue S with dual beam passing areas near the Lander Station and near S Horton Street. The Preferred Alternative Stations are Weller/King 2 (Event), Safeco 1, and Lander 3 (Diagonal).

Table 1-1. Summary of Green Line Alignment Alternatives (continued)

Alternative Number/Name	Key Features
Segment 6: West Seattle	See Figure 1-6 for an area depiction and Chapter 3 for more detail.
Duwamish Crossing	Three alignment choices across the Duwamish River have been evaluated but are interchangeable with other areas in the West Seattle Segment. Alternative 6.1 (West Seattle I): Horizontal dual beam guideways crossing over SR 99 past Terminal 25 to the center of the West Seattle High-Rise Bridge. This alternative features two possibilities for departing the bridge: • Alternative 6.1.1 (Past Pigeon Point) departs the bridge near Delridge Way SW • Alternative 6.1.2 (To Pigeon Point) departs the bridge at the north end of the West Duwamish Green belt. Alternative 6.1(s) (West Seattle I – single beam): A single beam guideway crossing over SR 99 past Terminal 25 to the center of the West Seattle High-Rise Bridge. This alternative features Alternative 6.1.1(s) (Past Pigeon Point) for departing the bridge. Alternative 6.2 (West Seattle II): Horizontal dual beam guideways crossing over SR 99 past Terminal 25, then crossing the Duwamish River on a new Monorail-only bridge north of the West Seattle High-Rise Bridge.
Delridge Subsegment (from Delridge Way SW to Avalon Way SW)	Six alternatives are evaluated in the Delridge area. Again, regardless of their numbering, any of these alternatives can be paired with any alignment from the Duwamish Crossing or any other area of West Seattle. Alternative 6.1 (West Seattle I): Horizontal dual beams traveling on the northwest side of Delridge Way SW to SW Yancy Street to the existing turn lane in the center of SW Avalon Way, with Delridge 1 (26th) Station southwest of SW Andover Street and 26th Avenue SW and SW Yancy Street. Alternative 6.2 (West Seattle II): Horizontal dual beams departing the bridge at Delridge Way SW south of the Nucor Steel plant and climbing west to SW Avalon Way with Delridge 2 (Andover) Station southwest of SW Andover Street and 26th Avenue SW. Alternative 6.3(s) (Delridge North single beam): A single beam traveling along the south side of the West Seattle Bridge from Pigeon Point to SW Avalon Way with Delridge 3 (Nucor) Station south of SW Spokane Street west of Delridge Way SW. Alternative 6.4 (Andover/Yancy): Horizontal dual beams crossing diagonally between SW Andover Street and SW Yancy Street with Delridge 1A (26th) Station east of Longfellow Creek. Alternative 6.4(s) (Andover/Yancy single beam): A single beam crossing diagonally between SW Andover Street and SW Yancy Street with no station in the Delridge area and switches to facilitate the transition between single and dual beam. Alternative 6.5 (Genesee): Horizontal dual beams continuing south along the west side of Delridge Way SW, turning west to follow the south side of SW Genesee Street, and then turning to follow the center left turn lane of SW Avalon Way with Delridge 4 (Genesee) Station near the intersection of Delridge Way SW and SW Genesee Street.

Table 1-1. Summary of Green Line Alignment Alternatives (continued)

Alternative Number/Name	Key Features
Avalon Subsegment	Five alignment choices are evaluated in the Avalon area. Alternative 6.1 (West Seattle I): Horizontal dual beams traveling along the center left turn lane of SW Avalon Way to an Avalon 1 (Center) Station, with two alternative alignments along Fauntleroy Way SW: • Alternative 6.1.3 on the northwest side of Fauntleroy Way SW • Alternative 6.1.4 on the southeast side of Fauntleroy Way SW Alternative 6.2 (West Seattle II): Horizontal dual beams traveling along the center left turn lane of SW Avalon Way to 35th Avenue SW and then to SW Alaska Street in three alternative alignments: the original 6.2 route on the east side of 35th Avenue SW and the center lane of SW Alaska Street, or • Alternative 6.2.1 on the east side of 35th Avenue SW (with Avalon 2A (35th) Station) and north side of SW Alaska Street • Alternative 6.2.2 in the center of 35th Avenue SW (with Avalon 2B (35th) Station) and the north side of SW Alaska Street.
Alaska Junction Subsegment	Two alignment choices are evaluated in the Alaska Junction area Alternative 6.1 (West Seattle I): Horizontal dual beam guideways would turn south at 42nd Avenue SW and transition to a vertical configuration to Alaska Junction 1 or 1A (42nd/Edmunds) Station on the west side of 42nd Avenue SW, then would cross southwest near SW Edmunds Street to California Avenue SW. Alternative 6.2 (West Seattle II): Horizontal dual beam guideways would travel along SW Alaska Street to Alaska Junction 2 (44th/California) Station at 44th Avenue SW, turn south along the east side of 44th Avenue SW then to California SW.
California/Morgan Junction Subsegment	Four alignment choices are evaluated along California Avenue SW. Alternative 6.1 (West Seattle I): Horizontal dual beams traveling along the center of California Avenue SW to the Morgan Junction 1 or 1A (West) Station. Alternative 6.1.6 (West of California): Horizontal dual beams traveling along the west side parking lane along California Avenue SW, to the Morgan Junction 1A (West) Station. Alternative 6.1.6(s) (West of California single beam): Single beam traveling along the west side parking lane along California Avenue SW with switches near SW Edmunds Street and the Morgan Junction 1A (West) Station Alternative 6.2 (West Seattle II): Horizontal dual beams traveling along the east side of California Avenue SW to the Morgan Junction 2 (Center) Station.

Table 1-1. Summary of Green Line Alignment Alternatives (continued)

Alternative Number/Name	Key Features
West Seattle Preferred Alternative	The Preferred Alternative for West Seattle combines a number of the alignment alternatives discussed above as follows: • Duwamish Crossing: Single beam configuration over the West Seattle Bridge departing past Pigeon Point (Alternative 6.1.1(s)) • Delridge: Single beam configuration north of the steel plant to SW Avalon Way (Alternative 6.3(s)) • Avalon: Horizontal dual beam configuration in the center of 35th Avenue SW and the north side of SW Alaska Street (Alternative 6.2.2) • Alaska Junction: Along the west side of 42nd Avenue SW and then to California Avenue SW near SW Edmunds Street (Alternative 6.1) • California/Morgan Junction: Single beam configuration along the west side of California Avenue SW (Alternative 6.1.6(s)) The stations are Delridge 3 (Nucor), Avalon 2B (35th), Alaska Junction 1 (42nd/Edmunds), and Morgan Junction 1A (West).

1.12 WHAT ENVIRONMENTAL IMPACTS COULD THE GREEN LINE HAVE?

The alignment and station location alternatives that were described above were carefully analyzed to determine the impacts they could cause to the environment. Potential impacts to traffic and parking, noise and vibration, visual quality, neighborhoods, utilities, historic resources, and other subject areas were studied. Possible mitigation measures—which could reduce or eliminate these potential impacts—were identified in the Draft EIS and have been further refined as presented in Chapter 5 of this Final EIS. The EIS was deliberately developed to be quite conservative, using conservatively large station and guideway sizes and not assuming any design details or landscaping around stations. In this way, a range of potential impacts that is higher than anticipated with the actual Green Line could be identified and analyzed.

All NEPA and SEPA required subject areas were analyzed in the EIS. Tables 1-2 through 1-7 summarize the potential long-term operational impacts in each of these subject areas for different Green Line alternatives. Table 1-8 summarizes the potential impacts for the two Operations Center alternatives. Table 1-9 summarizes the potential construction impacts. Tables are presented at the end of this section. These tables are broad summaries, and the reader is encouraged to refer to the text for greater detail. The SMP November 2003 Preliminary Staff Recommendation and January 2004 Final Staff Recommendation contain additional information on “mix and match” subsegments and are available at SMP’s office or on the SMP website at elevated.org.

Transportation. To evaluate potential impacts to transportation from the Green Line alternatives, SMP studied a number of factors, including other forms of transit and the potential for connections at Green Line station locations, traffic volume and level of service (LOS) at intersections surrounding station location alternatives, traffic accident histories at those intersections, pedestrian and bicycle circulation in the areas surrounding potential stations, parking supply and demand, and freight roadways that could be affected by the placement of the guideway.

SMP developed a set of guidelines for the alignment with the City of Seattle Department of Transportation and other stakeholders, concluding that side-of-street alignments, in general, would permit better traffic flow and turning movements than center-of-street alignments. The transportation section in this EIS carefully evaluates implications of both side and center alignments; however, based on this analysis, the Preferred Alternative includes side-of-street alignments in most areas along the Green Line route.

Green Line construction along the alignment would cause temporary transportation impacts during construction due to lane closures. Mitigation measures would reduce or avoid some operational and construction impacts. The loss of on-street parking spaces on Second Avenue and off-street parking lots on Fifth Avenue, Pine Street, Second Avenue, and First Avenue in the Downtown Segment, associated with Alternatives 4.1 (185 on-street and 358 off-street), 4.2 (122 on-street and 497 off-street), and 4.3 (236 on-street and 1,027 off-street), could be considered a significant unavoidable adverse impact for those who have no other alternative but to travel Downtown by car. There are no significant unavoidable adverse transportation or parking impacts from any other Green Line alternative alignment. More information can be found in Sections 4.1, Transportation, and 4.17, Construction .

SMP also studied potential impacts to navigation from the Ballard Crossing and Duwamish Crossing to evaluate different alternatives and locations. That analysis is detailed in Section 4.1 of this Final EIS and in Appendix P, Navigation Backup Information, of the Draft EIS, and indicates that there would be no significant unavoidable adverse impacts to navigation in either the Ship Canal or the Duwamish Waterway from any of the Green Line alternatives.

Displacements and Relocation. To evaluate potential displacements from the Green Line alternatives, SMP evaluated the potential need for full or partial property acquisitions or air rights needed along the alignment of each evaluated alternative and at each station location alternative. Conservatively large footprints for stations and guideways were assumed to allow evaluation of the full range of potential property needs. The analysis indicated that business and residential displacements caused by acquiring property for the Green Line would be mitigated by purchasing property at fair market value, by providing relocation assistance as required by SMP resolution, and by helping displaced businesses relocate within Seattle. No significant unavoidable adverse impacts are expected. More information about potential impacts to businesses and residents from displacement and relocation is provided in Section 4.2, Displacements and Relocation, as well as in Appendix QQ, Displacements and Relocation Backup Information.

Land Use and Neighborhoods. The land use analysis discloses that, in general, impacts to land use and neighborhoods would primarily be due to displacement and to the temporary impacts from construction, but that no significant unavoidable adverse impacts to neighborhood character or land use plans are anticipated from development of the Green Line. Localized impacts from height, bulk, and scale could generally be mitigated through design. More information can be found in Section 4.3, Land Use and Neighborhoods, in this Final EIS and in Appendix U, Land Use Backup Information, in the Draft EIS.

In the Queen Anne/Seattle Center/Belltown Segment, the Green Line alignment alternatives that would travel through Seattle Center (Alternatives 3.1 and 3.3) could affect its visual setting but would not affect its use. An Operations Center in either the Interbay or SODO Segments would be compatible with the existing uses in those neighborhoods and with underlying zoning. However, Alternative 6.5, Genessee, would introduce the guideway and columns at a height and scale that would be significantly out of scale with existing and planned uses, and could not be mitigated.

Economics. To study the potential impact of the Green Line on the regional and local economy, SMP considered potential impacts from business displacements, tax revenue loss, and project expenditures. The Green Line could stimulate the local and regional economies by providing construction and other Project-related jobs and multiplier spending, as well as by providing a transit alternative for residents, workers, business owners, and tourists. Because the Green Line would be constructed primarily in the right-of-way and because any businesses that must be relocated would be assisted to relocate within the city, and are expected to be able to relocate within the city, economic impacts from loss of Business & Occupation taxes are not anticipated to be substantial. Construction activities would temporarily increase

noise, dust, and congestion; decrease parking; and could interfere with pedestrian, automobile, and freight access to nearby businesses. These impacts would be mitigated by construction management practices. No significant unavoidable economic impacts are anticipated. For more information, please see Sections 4.4, Economics, and 4.2, Displacements and Relocation.

Visual Quality and Aesthetic Resources. SMP conducted visual tours along the alternative alignments and prepared visual simulations to illustrate guideway and station structures within the urban context. These simulations were developed using conservatively large station and guideway envelopes without design detail so as to disclose greater than anticipated visual impacts. In addition, enhanced simulations were prepared for some of the simulations to show how stations could look with design and landscaping. Along the alignment, temporary visual impacts from construction activities may be experienced. A variety of mitigation measures are available to reduce the visual impacts of the Green Line during construction and operation.

The Green Line would be set in an urban context where visual change is expected, and differences in scales of structures are typical. However, the perception of some viewers may be that the visual changes associated with the Green Line to Downtown, at the Ballard Crossing, at the Seattle Center and Downtown are significant, particularly when considered at a single location. The far west bridge alignment alternative across the Ship Canal would result in changes to the visual character of the Fishermen's Terminal area that would be perceived as significantly adverse to some viewers.

The City of Seattle's Downtown and Seattle Center are dynamic settings with some existing structures similar to the Green Line. The overall degree of change within the context of these more urban neighborhoods is typically moderate. Some viewers would perceive the visual change to Seattle Center as adverse, but other viewers would perceive the changes to be highly consistent with the character of Seattle Center, and not adverse. In the Downtown area, the visual change would impact historic resources, and notable civic architecture, and some views of Puget Sound would be partially obstructed and the appearance and character of Second Avenue significantly altered.

Air Quality. To study the potential impacts of the Green Line on air quality, SMP reviewed general information on air quality and modeled potential air quality impacts at three intersections determined by transportation analysis to have the most degraded level of service conditions. Based on this analysis, none of the Green Line alternatives are expected to have adverse impacts to air quality. By reducing car and truck trips, the Green Line is anticipated to have a net positive impact on air quality. Temporary air quality impacts related to dust and construction equipment emissions could occur during construction, but could be mitigated through construction Best Management Practices. No significant unavoidable impacts to air quality are anticipated. For more information, please see Section 4.6, Air Quality.

The Project has also been regionally modeled by the Puget Sound Regional Council (PSRC), a positive air quality finding has been made, and conformity with State and Federal air quality standards has been determined. The Project has been included in the 2004-2006 Regional Transportation Improvement Plan (TIP), which has been approved by the Federal Highway Administration (FHWA) and the Federal Transportation Authority (FTA).

Noise and Vibration. To evaluate the potential impacts of noise and vibration on nearby properties from the Green Line alternative alignments, SMP used measuring equipment to record and analyze noise and vibration from existing monorails. These readings were then expanded to provide estimates for a Monorail train traveling at speeds up to 50 miles per hour. Because the existing Seattle Center Monorail and its guideway structures are over 40 years old and newer technology reduces both noise and vibration, these estimates provide a conservative estimate of potential noise and vibration impacts from the Green Line. Although monorail technology is significantly quieter than other forms of transportation such as

buses and steel-railed trains, noise impacts in certain neighborhoods may require mitigation. The EIS analyzes a variety of potential mitigation measures, including requiring reduced noise levels in new trains, guideway improvements, limiting train speeds at certain hours, and protecting sensitive receptors.

Without effective implementation of these mitigation measures, operational noise from the Green Line could cause significant noise impacts at a number of residences along the alignment alternatives. These impacts are based on modeling using conservative assumptions and may be avoided with modern train specifications. To the extent noise impacts cannot be completely avoided, additional mitigation measures will be implemented as needed, based on noise monitoring during Green Line operations. Please see Chapter 5, Mitigation Program, for more information. Potentially significant noise impacts have been identified in the following areas: along 15th Avenue NW in Ballard, along W Harrison Street, in Downtown between Virginia and Marion Streets, in West Seattle along SW Yancy Street, in the SW Avalon Way area, and along California Avenue SW between SW Hudson and SW Holly Streets. For more information, please see Section 4.7, Noise and Vibration.

Energy. To evaluate the potential impacts of the Green Line on regional energy use, SMP analyzed current transportation energy use and the estimated energy needed to construct and operate the Green Line. Based on this analysis, the Green Line is not expected to result in any substantial impacts to energy resources. Energy conservation measures, incorporated as part of SMP's commitment to environmental sustainability, could reduce the Green Line's overall energy use. No significant unavoidable impacts to energy are anticipated. For more information, please see Section 4.8, Energy.

Public Services and Utilities. To evaluate the potential impacts of the Green Line on public services and utilities, SMP mapped utility locations as well as public services, including police stations, fire stations, schools, and hospitals, along and near the alternative alignments. SMP also consulted with City of Seattle utility and public services staff to discuss the potential implications of Green Line alternative alignments.

For all segments, no significant unavoidable adverse impacts to public services or utilities are expected, and mitigation measures have been identified to enhance mobility and limit service disruptions. There may be temporary delays in emergency service response times due to construction activities, which would be mitigated. For more information, please see Section 4.9, Public Services and Utilities, and Section 4.17, Construction.

Parks and Recreation. To evaluate potential impacts of the Green Line on nearby parks and recreation resources, SMP mapped parks and open spaces near the Green Line alternative alignments and analyzed the impacts that construction and operation of the Green Line might cause. Construction and operation of a station at Longfellow Creek Greenspace would result in changes to the visual character and vegetation of the creek buffer at this location that could be perceived as a significant unavoidable adverse impact by park users. Mitigation could provide improvement over existing conditions, including planting and access improvements. Similarly, construction of the guideway at Pigeon Point would result in changes to the visual character and vegetation of the greenbelt that could be perceived as an adverse impact by residents near the greenbelt. Mitigation would provide some revegetation and infill planting for the greenbelt. Construction of the Avalon 2A (35th) station (which is not part of the Preferred Alternative) would result in the removal of the existing tree buffer along the northwest side of the West Seattle Golf Course. Park users could perceive this as a significant adverse impact to the quality of the interior of the park. Mitigation would provide some revegetation but the buffer would not be replaced. This would be considered a significant impact to West Seattle Stadium Park, which could be mitigated through selection of a different station alternative or through appropriate design and provision of replacement park property. For more information, please see Section 4.10, Parks and Recreation.

Cultural Resources. To evaluate the potential impacts of the Green Line on historic and cultural resources, SMP developed an Area of Potential Effect (APE) along the alternative alignments in consultation with the City of Seattle Historic Preservation Officer and the State Historic Preservation Officer. All potential cultural and historic resources within this APE were then identified, catalogued, mapped, and researched, and potential impacts on them were analyzed, again in consultation with the City and State Historic Preservation Officers.

Impacts to archaeological resources would be limited to Green Line construction, including locations of guideway columns, bridge piers, Operations Center alternatives, several stations where buildings could be removed, and/or stations where grading could penetrate fill into native soils. A high concentration of the historic resources within the APE of the Green Line occur in Downtown Seattle. The Green Line would involve significant adverse affects due to alteration of the visual character or the setting of significant historical resources. Some alternatives would demolish historic resources. The Green Line would cross a portion of the Pioneer Square Historic District. Significant unavoidable visual impacts to the district and individual historic resources within the district would be an adverse effect. Some of these impacts could be mitigated through creative design solutions, such as compatible station design and the placement of columns away from historic buildings. Other adverse impacts could be mitigated through off-site mitigation measures. For more information, please see Section 4.11, Cultural Resources, and Appendix NN, Section 106 Cultural Resources Report.

Environmental Health. The Green Line would be built in a dense urban environment in which many previous uses (including gas stations and landfills) leached contaminants into the soil. To evaluate whether Green Line construction would be likely to cause releases from these potentially contaminated properties, SMP analyzed databases of contaminated properties and mapped these properties in relation to the Green Line. Hazardous materials would be used on a limited basis during regular maintenance of Monorail machinery and use of maintenance vehicles to service the system. The Operations Center will include design and management practices that minimize the likelihood of any release to the environment. No significant unavoidable adverse environmental health impacts were identified for any of the alternatives, although historic contamination on SMP-acquired property would be remediated as required by Model Toxics Control Act standards before or during Green Line construction. The number of known release sites of hazardous materials on or adjacent to the Green Line stations and alignments are reported in Table 1-9. For more information, please see Section 4.12, Environmental Health.

Earth. SMP identified and evaluated the potential effect that existing geologic conditions (physiography, geological units, groundwater, and geologic hazards) may have on the construction and operation of the Green Line, as well as how the construction activities and operation of the Green Line could affect geologic conditions along the route. Puget Sound is in a seismic zone with moderate to high seismic activity. Construction impacts that could occur with any of any of the Green Line alternatives include vibration, settlement, erosion, dewatering, and disposal of contaminated soil and groundwater. A number of mitigation measures could be implemented to reduce or avoid impacts. In the Queen Anne/Seattle Center/Belltown Segment, Alternative 3.1 would have potential for slope instability if construction occurs on the steep slope near Memorial Stadium. In the West Seattle Segment, land sliding is a concern for Alternative 6.1.2 (West Seattle Bridge to Pigeon Point). For more information, please see Section 4.13, Earth.

Water. To study the potential impact of the Green Line on water quality, SMP inventoried the water resources along the route and analyzed the likelihood that Green Line trains, stations, or other facilities would add pollutants to stormwater. This analysis included both pollutant-generating impervious surfaces (such as roadways and parking lots) and non-pollutant-generating impervious surfaces (such as clean roofs) that would be created from construction of the Green Line stations. No significant unavoidable adverse impacts to water quality are anticipated. Because it will be constructed primarily on existing

impervious surfaces, and because it will meet current city and state requirements for runoff control from stations and the Operations Center, the Green Line is likely to reduce the amount of runoff from pollution-generating surfaces. Sources of pollution could result from the station sites, associated off-site pick-up and drop-off areas and bus layover zones, the Operations Center, guideways, and traction power substations. For more information, please see Section 4.14, Water.

Plants and Animals. To evaluate the potential impacts of the Green Line on plants and animals, SMP mapped habitat areas along the alignment alternatives and then conducted field investigations and additional research to analyze the potential impacts. Key areas examined include the Lake Washington Ship Canal, Duwamish Waterway, and the Longfellow Creek vicinity. No significant unavoidable adverse impacts to fish, wildlife, or vegetation are anticipated to result from construction and operation of the Green Line. Potential impacts to waterways will be mitigated through use of construction best management practices and enhancement or replacement of affected habitat. For more information, please see Section 4.15, Plants and Animals.

Construction. This section discusses the impacts that could occur during construction of the Green Line and outlines Best Management Practices that could be used during construction. No significant unavoidable adverse impacts are anticipated from construction. Table 1-9 summarizes construction impacts and mitigation. For more information, please see Section 4.17, Construction, in this Final EIS.

1.13 WHAT IS THE PREFERRED ALTERNATIVE?

This Final EIS recommends a Preferred Alternative to indicate SMP staff's recommendation following environmental, engineering, operational, and design studies, and extensive community involvement. This section describes the components of the Preferred Alternative and summarizes the key factors that were relevant to staff's recommendation. This summary does not attempt to provide information about all areas of the environment, which is found in more detail in Chapter 4. Additional summary information can be found in Tables 1-2 through 1-9 and in discussions above.

1.13.1 Ballard

In Ballard, the Preferred Alternative includes a single beam alignment along the west side of 15th Avenue NW serving a Ballard Crossing just west of the existing Ballard Bridge. Preferred Alternative alignment and station locations in Ballard are:

Crown Hill Station

The recommended station at Crown Hill is a terminus station near the southwest corner of NW 85th Street and 15th Avenue NW (designated Crown Hill 1A (West, 85th) in this EIS). This station alternative was selected because use of a single platform terminus station will meet passenger demand with a design that is compact and in scale with the surrounding neighborhood, while allowing for the possibility of expansion in the future. The station's location south of the intersection will allow convenient access for Metro buses and will avoid spanning the intersection.

15th Avenue NW Alignment

Along 15th Avenue NW, a single beam configuration on the west side of the street is recommended between the Crown Hill and NW Market stations (Alternative 1.1(s)). The west side alignment is recommended because it will allow freer traffic movement during peak hours, will make left-turn access into businesses easier and will retain more on-street parking than a center alignment. Although a west

side alignment will result in potential noise impacts to a larger number of residences than a center alignment, these impacts will be reduced with the use of the recommended single beam configuration.

NW 65th Street Station

The NW 65th Street Station is recommended to be a side platform station on the southwest corner of NW 65th Street and 15th Avenue NW (NW 65th 1B (West)). This station location will provide convenient access to Ballard High School and the surrounding commercial and residential neighborhood, while minimizing impacts to Ballard High School. Switches located north and south of the station will facilitate a transition in and out of a single beam configuration.

NW Market Street Station

The NW Market Street Station is recommended to be a vertical station at the northwest corner of NW Market Street and 15th Avenue NW (NW Market 3A (Northwest)). This station location will provide convenient bus transfers. A switch location north of the station will facilitate a transition from a single beam configuration to a vertical dual beam configuration. A vertical station in this location will complement the surrounding urban design context.

Ballard Crossing

The Ballard Crossing will be a modified box girder, dual beam Monorail-only bridge across the Lake Washington Ship Canal located just west of the existing Ballard Bridge (Alternative 1.1.1). A crossing west of the Ballard Bridge will correspond to the recommended Green Line alignment on the west side of 15th Avenue NW in Ballard and 15th Avenue W in Interbay without the need to cross back and forth across the street. This location was chosen because it would require fewer business displacements. Adequate separation will be provided to allow the existing Ballard Bridge flexibility for possible future expansion. The proposed box-girder structure with the dual guideway spans as noted above would have smaller columns and less total structure above the water than other bridge types. In response to community comments on the Draft EIS, it would also provide the lowest profile along the length of the crossing and reduce view impacts from surrounding neighborhoods, provide sufficient navigational clearance (an envelope height of 120 to 125 feet over the entire width of the navigation channel), minimize construction costs and duration, and help limit the possible construction impacts to users of the maritime environment, including tribal fisheries.

1.13.2 Interbay/Magnolia

In Interbay, the Preferred Alternative includes a dual beam alignment along the west side of 16th and 15th Avenues W and along the center of Elliott Avenue W, with switches to allow trains to transfer in and out of an Operations Center located near W Armory Way. Specific alignment and station locations included in the Preferred Alternative in Interbay are:

16th Avenue W and 15th Avenue W Alignments

A horizontal, dual beam guideway is recommended on the west side of 16th Avenue W north of W Dravus Street and on the west side of 15th Avenue W south of W Dravus Street (Alternative 2.1). Locating the guideway on the west side of 16th Avenue W north of W Dravus Street will provide better bus connections and pedestrian access to a station on Dravus, and will also require fewer business displacements and result in lower traffic impacts than an alignment on 15th Avenue W. South of Dravus, a west side alignment along 15th Avenue W will provide better left turn and traffic movement.

Dravus Station

For the Dravus Station, a side platform station is recommended to be located between 15th and 16th Avenues W, mid-block between West Barrett and West Dravus Streets (Dravus 1B (Barrett)). This station location was evaluated based on comments received following the release of the Draft EIS. The recommended station location will provide improved pedestrian access, bus layovers and drop off, and vehicle access from 15th Avenue W than would the other alternatives that were studied. It will also minimize property acquisition, parking loss, business displacements, and construction impacts on the adjacent grocery store, which is a locally important land use.

Operations Center

The Operations Center to house the Monorail's command and control, train maintenance, and headquarters is recommended to be located on approximately seven acres west of 15th Avenue W on a triangular lot north of W Armory Way (Alternative C-1). Locating the Operations Center in Interbay rather than in SODO will require fewer and less complex business relocations, will fit well with the surrounding community, and is estimated to cost \$5 to \$10 million less than the SODO alternative that was studied.

Future Howe/Blaine Station

In the Howe/Blaine area, the guideway will be constructed so that a station could be built to serve potential new development if it occurs. The future station would be located on the west side of 15th Avenue W south of W Blaine Street (Howe 1A (Blaine)). This future station would provide connections to potential new development as well as to a potential Sounder commuter rail station. The W Blaine Street location is recommended to allow the minimum vertical guideway clearances needed to reach the Operations Center.

Elliott Avenue W Alignment

Along Elliott Avenue W, a horizontal, dual beam guideway along the center of the street transitioning to a vertical configuration at the station is recommended (Alternative 2.1). A center alignment is recommended here rather than a west alignment to provide better through-traffic and freight mobility, as well as lower costs (\$5 to \$10 million less), and to allow for the City's planned off-ramp from the Galer Flyover.

Elliott and Mercer Station

At Elliott and Mercer, a vertical station, served by a dual beam guideway that transitions in and out of a vertical configuration at the station is recommended. The station would be located on the east side of Elliott Avenue W between W Mercer and W Republican Streets, with platforms spanning the east side of Elliott Avenue W to meet the guideway (Elliott and Mercer 1A (Center)). A station on the east side of the street is recommended to serve the nearby residential and office developments along Elliott Avenue W and Queen Anne Hill.

1.13.3 Queen Anne/Seattle Center/Belltown

In the Seattle Center area, the Preferred Alternative includes the "Northwest Route" through the Center to serve the diverse and vibrant activities at the Center. Stations located near Key Arena, Fifth and Broad, and Bell Street would serve event-goers, shoppers, tourists, and residents. Specific alignment and station locations included in the Preferred Alternative in this area are:

W Harrison Street Alignment

Along W Harrison Street, a horizontal, dual beam guideway on the south side of the street is recommended (Alternative 3.1). A south side alignment would require less property acquisition for the turns from Elliott Avenue W and into Seattle Center, would allow a lower height guideway and minimize the need for air rights, and would have fewer impacts on this narrow street than a north side alignment because there are fewer buildings on the south side.

Queen Anne/Seattle Center Station

A center platform station is recommended near the northwest corner of Key Arena east of First Avenue N in the area currently occupied by the Northwest Rooms (Seattle Center/Queen Anne 1A (North)). This location is recommended to provide easy access from both Seattle Center and the surrounding community, while providing capacity for event crowds.

Seattle Center-Area Alignment

The “Northwest Route” with a horizontal, dual beam guideway is recommended to travel through Seattle Center along the paved path of Republican Street, along the west end of Memorial Stadium, over the Fun Forest, and through the Experience Music Project (Alternative 3.1 through Center, Alternative 3.1.1 through EMP, Alternative 3.1.4 approaching Fifth and Broad Station). This route is recommended in response to community comments, to minimize impacts on local businesses and to traffic flow, and to maximize consistency with local land uses. The recommended route would also reduce travel times over other alternatives that were evaluated.

Fifth and Broad Station

An event/turnback station with switches for a Downtown Turnback is recommended to be located on Fifth Avenue N between John and Broad Streets (Seattle Center/Fifth and Broad 1A). This station location would provide convenient pedestrian connections to Seattle Center and easy access for Belltown residents. It would require fewer business displacements than other alternatives that were studied. It would include switches for a Downtown Turnback for more frequent service through the Downtown area.

Fifth Avenue Alignment

Along Fifth Avenue through Belltown, a west side alignment with a horizontal, dual beam guideway transitioning to a vertical alignment at the Bell Street Station and remaining vertical until after the Fifth and Stewart station is recommended (Alternative 3.2.1). A west alignment will increase traffic mobility, compared to a center alignment, for which the City would require a continuous median that would isolate lanes on either side of the guideway and restrict turns between lanes and into driveways and side streets. A west alignment will also allow a wider west side sidewalk and increased pedestrian activity and, possibly, a bicycle lane.

Bell Street Station

A vertical station is recommended on the west side of Fifth Avenue south of the intersection with Bell Street (Belltown 1A (Center-West)). This station location is recommended to provide convenient pedestrian access for Belltown residents and shoppers, while minimizing business displacements and impacts to nearby properties.

1.13.4 Downtown/Pioneer Square

Downtown, the Preferred Alternative includes a dual beam alignment along the west side of Second Avenue that will transition between a horizontal configuration between stations and a vertical configuration at stations. The horizontal configuration between stations is recommended to minimize view impacts. The vertical configuration at stations is recommended to minimize traffic impacts, as it will allow stations to be built off the right-of-way. Stations are recommended at Fifth and Stewart, Pike Street, Madison Street, and Yesler Way. Specific alignment and station locations included in the Preferred Alternative for Downtown are:

Fifth and Stewart Station

A vertical station is recommended northwest of the intersection of Fifth Avenue and Stewart Street, served by a dual beam guideway that transitions out of a vertical configuration after the station, with a mezzanine and an elevated pedestrian walkway to Westlake Center (Fifth and Stewart 2A (Virginia Center)). This station location is recommended to provide convenient pedestrian access to the Downtown retail core and other forms of transit, including the Downtown Seattle Transit Tunnel and a potential Westlake streetcar. It will also avoid the demolition of a historic building and minimize business displacements compared with other alternatives.

Stewart Street Alignment

Along Stewart Street, a horizontal, dual beam guideway is recommended south of the center of the street (Alternative 4.1.2). This alignment location will minimize impacts to historic buildings.

Second Avenue Alignment

Along Second Avenue, a horizontal, dual beam guideway on the west side of the street transitioning in and out of a vertical configuration at stations at Pike, Madison, and Yesler is recommended (Alternative 4.1). The EIS studies potential alignments on the west side, east side, center, and east of center of Second Avenue. The west side alignment is recommended because it will provide the smoothest traffic flow with no restrictions on turning movements, less need for utility relocation, less shading to the public open spaces on the east side of the street, and less tree replacement than other alternatives. This alignment would also require less time to construct and be less costly than other alternatives.

Pike Station

A vertical station is recommended on the west side of Second Avenue between Pine and Pike Streets (Pike 1B (West)). This station location is recommended to avoid demolition of a historic building, while providing convenient pedestrian access to Second Avenue and Pike Place Market.

Madison Station

A vertical station is recommended on the west side of Second Avenue between Madison and Spring Streets, on the site of the Federal Reserve Building (Madison 1 (West)). This station location is recommended to provide convenient access to the Downtown office core and the Colman Dock ferry terminal.

Yesler Station

A vertical station is recommended on the west side of Second Avenue at Yesler Way on the site of the “Sinking Ship” garage (Yesler 1 (West)). This station location is recommended to minimize impacts to

the historic Smith Tower while providing convenient pedestrian access to Pioneer Square. Although this station location would displace a significant amount of off-street parking, the location would not affect any historic buildings and is supported by Pioneer Square stakeholders.

1.13.5 SODO/Chinatown International District/Pioneer Square

In SODO, the Preferred Alternative includes a single beam configuration south of Safeco Field, with stations at Weller/King, Safeco, and S Lander Street. Specific alignment and station locations included in the Preferred Alternative in SODO are:

Weller/King Alignment

A horizontally arranged guideway between Yesler Way and S Royal Brougham Way is recommended west of King Street Station crossing nearly perpendicular to the railroad tracks south of Seahawks Stadium (Alternative 5.2(s)). This recommended alignment will keep spans across the railroad tracks as short as possible, maintain truck and emergency vehicle access to the stadiums, keep the guideway from restricting future development, and minimize visual impacts to King Street Station.

Weller/King Station

An event/turnback station is recommended south of the S Weller Street Pedestrian Bridge. The station would have switches to the south to accommodate a Downtown Turnback (Weller/King 2 (Event)). This station location is recommended to serve the Chinatown International District and Pioneer Square communities, provide capacity for crowds at both stadiums and the Exhibition Center, and facilitate connections to the Downtown Seattle Transit Tunnel, commuter rail, and Amtrak. A station location to the south of the Weller Street pedestrian overpass will position the station platform further from the historic King Street Station than other alternatives that were studied and will minimize interference with planned redevelopment of that site and with the parking lot north of the football stadium, while optimizing connections to other transit modes.

Safeco Station

A side platform station with switches south of the station to allow for a transition to a single beam guideway is recommended on the east side of Safeco Field (Safeco 1). This station location is recommended to provide convenient access for event goers and to provide sufficient vertical clearance over a future overpass of the railroad tracks at S Royal Brougham Way, which could be constructed in conjunction with Washington State Department of Transportation's (WSDOT) SR 519 project.

Third Avenue S Alignment

A single beam guideway is recommended on the west side of Third Avenue S (Alternative 5.2(s)). This alignment is recommended to minimize impacts to traffic flow, maximize access to businesses, ensure that Green Line columns can be located along the street right-of-way in a configuration that would leave adequate clearance from Burlington Northern Santa Fe (BNSF) Railroad tracks and a future planned Sound Transit or BNSF signal bridge, and provide adequate space for truck turning movements. A single beam guideway configuration is recommended to reduce the costs for the special structures needed in this area of the route while still meeting ridership demand.

Lander Alignment

A horizontally arranged guideway diagonal to the street grid and passing to the north of the Seattle Public Schools' headquarters is recommended, with switches to the south and north of the Lander station to allow for the transition between single and double beam guideway (Alternative 5.2(s)). In this area the Preferred Alternative was selected to avoid an area of S Lander Street where the City plans to construct an elevated roadway overpass, minimize travel time, and avoid the need to incorporate two 90-degree turns in the Monorail guideway, which would be required by following the street rights-of-way through the area. The alignment would meet BNSF safety requirements and future plans, and avoid a fiber optic ductbank. The alignment would transition to a double beam configuration in this area to allow trains to pass each other at the Lander station.

Lander Station

A side platform station is recommended north of S Lander Street at an angle to the street grid between First Avenue S and Occidental Avenue S (Lander 3 (Diagonal)). This location is recommended to maximize access to the business and bus hub in the area and to serve employees in the area.

Lander to West Seattle Bridge Alignment

A single beam guideway is recommended on the west side of Utah Avenue S and the north side of S Horton Street, with special structures to provide long spans to facilitate turning movements for large trucks, and with switches located over S Horton Street and Terminal 25 to provide a passing area for trains (Alternative 5.2(s)). The recommended alignment would cross the S Spokane Street overpass (SR-99) and the southeast corner of Terminal 25. This alignment is recommended to maintain traffic flow and turning movements and maintain access for large trucks serving industrial businesses in the area.

1.13.6 West Seattle

The EIS evaluates a number of different alternatives for alignments and station locations in West Seattle. The Preferred Alternative for this area was developed in response to community comments and ongoing technical work. Specific alignment and station locations included in the Preferred Alternative in West Seattle are:

Duwamish Crossing

To cross the Duwamish River, a single beam guideway is recommended to be located above the center median of the West Seattle Bridge, departing the Bridge near Delridge Way SW after the Pigeon Point Greenbelt, and with switches located at both ends of the Bridge to facilitate the transition in and out of single beam configuration (Alternative 6.1.1(s)). This alignment is recommended to provide a cost-effective and environmentally sensitive crossing of the Duwamish River without affecting traffic flow on the West Seattle Bridge. The single beam configuration will reduce the retrofit needs of the West Seattle Bridge while meeting ridership demand.

Delridge Alignment

In the Delridge area, a single beam guideway is recommended to be located on and immediately north of the Nucor steel plant over the eastbound lanes of SW Spokane Street (Alternative 6.3(s)). Alignment alternatives for this area were updated following the release of the Draft EIS in response to community comments and ongoing technical work. This alignment alternative was selected as the Preferred Alternative because it would minimize traffic and parking impacts, provide better access for trucks and buses, move the guideway and station away from the Longfellow Creek Greenspace, and increase access

to the Green Line for Admiral and Alki residents compared with other alternatives that were studied. This alternative would not result in any impacts to the Longfellow Creek Greenspace.

Delridge Station

A side platform station is recommended on the northeast corner of the steel plant site near Delridge Way SW, with switches to facilitate a transition from the single beam guideway to a dual beam, horizontal guideway (Delridge 3 (Nucor)). This location is recommended to serve the updated recommendation for a Delridge alignment that would provide better access for Admiral and Alki residents and avoid impacts to the Longfellow Creek Greenspace.

Avalon to Alaska Station

A horizontally arranged guideway is recommended in the center of SW Avalon Way, center of 35th Avenue SW, and north side of SW Alaska Street (Alternative 6.2.2). This alignment is recommended to avoid impacts to West Seattle Stadium Park, allow for bus layover space, and allow for lane widths on 35th Avenue SW that will conform more closely to City standards than the existing substandard lane and parking widths. This alignment will avoid traffic impacts to Fauntleroy Way SW.

Avalon Station

A side platform station is recommended on the west side of 35th Avenue SW near SW Oregon Street, with platforms serving a center of street guideway (Avalon 2B (35th)). This station location is recommended to avoid impacts to West Seattle Stadium Park, save 40 to 50 significant trees and additional smaller trees, avoid the need to provide replacement property for the park under City Ordinance, and provide easier pedestrian connections for nearby residents and businesses than a station on the east side of the street.

Alaska Junction Alignment

A horizontally arranged guideway transitioning in and out of a vertical configuration to serve the Alaska Junction station is recommended on the west side of 42nd Avenue SW, turning to California Avenue SW south of SW Edmunds Street (Alternative 6.1). This alignment is recommended to maintain the visual integrity of the Alaska Junction area and avoid crossing the Alaska/California intersection with the guideway, minimize impacts to traffic, and provide maximum transit and pedestrian connections to the businesses, stores, and residences in and near the Junction.

Alaska Junction Station

A vertical station is recommended to be located on the west side of 42nd Avenue SW between SW Alaska and SW Edmunds Streets (Alaska Junction 1 (42nd/Edmunds)). This station location is recommended to provide convenient pedestrian and bus access to the Alaska Junction while minimizing impacts to nearby properties.

California Avenue Alignment

A single beam guideway is recommended along the west side of California Avenue SW, with switches located south of SW Dawson and north of the Morgan Junction station (Alternative 6.1.6(s)). This alignment is recommended to maintain the current left turn lane, provide better access to side streets and businesses along California Avenue SW, and retain more on-street parking than other alternatives. A single beam configuration is recommended to allow a more slender profile for the guideway to complement the surrounding neighborhood while accommodating projected ridership and future growth.

Morgan Junction Station

A terminus station is recommended to be located on the west side of California Avenue SW between SW Graham Street and Fauntleroy Way SW (Morgan Junction 1A (West)). This station location is recommended to allow convenient access for Metro buses and to avoid spanning the intersection. The single platform terminus station will complement the surrounding urban context. A switch will be located north of the station to allow trains access to a temporary storage track at the station.

1.14 WHAT IF THE GREEN LINE IS NOT BUILT?

Not building the Green Line (the No Action Alternative) would avoid the impacts identified for the Green Line alternatives. However, the transportation, land use, hazardous material cleanup, air quality, and water quality benefits of the Green Line would not be realized. New transit would not be provided linking the Morgan Junction, Alaska Junction, Ballard, and Crown Hill urban villages with the industrial areas of SODO and Interbay and with the urban center areas of Queen Anne, Belltown, Urban Core, and Pioneer Square. This would negatively affect the City of Seattle's ability to achieve its Comprehensive Plan policies to link those areas with transit along priority transit corridors. Traffic along the general Green Line alignment would be expected to increase, resulting in increased congestion and trip commute times.

1.15 WHAT ARE MITIGATION MEASURES AND HOW WILL THEY BE IMPLEMENTED?

Construction and operation of the 14-mile Green Line Monorail Project will result in a number of potential impacts to the environment. These potential impacts – to transportation, historic and cultural resources, water quality, parks, and other areas of the environment – have been identified, analyzed, and disclosed in the EIS. Based on its analysis of those potential impacts, SMP has identified a number of mitigation measures that will be implemented as appropriate through a Mitigation Program as the Green Line is constructed and operated.

What is the Mitigation Program?

The Mitigation Program includes strategies to reduce the potential impacts of construction and operation of the Green Line by reaching out to local residents and businesses and coordinating lane closures and traffic revisions with the City and Metro; minimizing impacts on historic resources; mitigating changes to access to traffic flow; and implementing environmentally sustainable measures to minimize the Monorail's overall impact on the environment through the use of renewable energy, recycled materials, and careful design. The Mitigation Program is comprised of mitigation measures, along with timing, responsibility and monitoring of these measures to ensure effective and timely implementation.

How was the Mitigation Program developed?

Potential impacts from construction and operation of the Green Line are identified in this EIS, which studies more than 50 potential Monorail alignment alternatives for their potential impacts on a number of environmental areas.

Mitigation measures to address these impacts were then developed by SMP through the analysis conducted for the EIS, as well as additional operational and engineering studies conducted to develop a Request for Proposals for the Design-Build-Operate-Maintain (DBOM) contractor team that will construct and operate the Green Line. In addition, ongoing discussions and meetings with residents, businesses, and property owners along the alignment, and with stakeholders from permitting and

regulatory agencies helped SMP develop appropriate mitigation strategies to address specific impacts. These mitigation measures were then consolidated into a Mitigation Program with information about timing, monitoring, and responsibility for each measure.

What will happen next?

Over the coming months, mitigation measures for the Green Line will be further refined and detailed. As this Mitigation Program evolves and becomes more specific, it, or parts of it as appropriate, will be included as an integral component in, or appropriately referenced in, a number of key policy documents, in addition to this Final EIS:

- The U.S. Coast Guard's Record of Decision on the Project
- Agreements with the City of Seattle, King County Metro Transit, and other regulatory and permitting agencies
- Master Use Permit Applications
- Guideway Permit Applications

Outline of Draft Mitigation Program

Mitigation measures included in the Mitigation Program to date have been organized by substantive area in Chapter 5 of this Final EIS so that they can be most easily identified and monitored.

Within each substantive area, mitigation measures have been organized into:

- General Mitigation Measures
- Geographically Specific Mitigation Measures by Segment

The areas include:

Transportation

Transportation mitigation measures are discussed in Section 5.4.1 of this Final EIS. Measures in this area include strategies to:

- Optimize multi-modal station access;
- Minimize impacts to traffic flow, suggesting a menu of potential mitigation measures for different conditions;
- Respond to concerns about parking availability; and
- Provide safe and convenient access to and from Monorail stations for pedestrians, bicyclists, and persons with disabilities.

Displacements and Relocation

Displacements and relocation mitigation measures are discussed in Section 5.4.2 of this Final EIS. Mitigation measures implemented to address displacements and relocation will be consistent with SMP's Real Property Acquisition and Relocation Policies, and include:

- Relocation for property owners and qualified tenants; and
- Housing assistance as needed for extremely low-income tenants.

Land Use and Neighborhoods

Land Use and Neighborhoods mitigation measures are discussed in Section 5.4.3 of this Final EIS. No significant unavoidable adverse impacts to land use plans and neighborhoods have been identified, although potential impacts to several specific venues at Seattle Center will be mitigated and impacts to certain neighborhoods will be mitigated in station design.

Economics

No significant adverse long-term impacts to economics have been identified due to operation of the Green Line. A detailed list of mitigation measures to address potential impacts of construction of the Green Line – including a comprehensive outreach program – is included under Construction Mitigation, Section 5.5 of this Final EIS.

Visual Quality and Aesthetic Resources

Mitigation measures to address visual quality and aesthetic resources are discussed in Section 5.4.4 of this Final EIS. Mitigation measures in this area include tools to ensure that the Green Line and its facilities complement existing neighborhood aesthetics, including:

- Overall review and recommendations from the Monorail Review Panel;
- Design Guidelines developed in concert with stakeholders;
- Replanting of street trees and other vegetation and landscaping per Design Guidelines;
- Shielding of station and facility lighting; and
- Minimization of structural bulk.

Air Quality

Operation of the Green Line would not have significant adverse air quality impacts, and would likely improve overall air quality. SMP will implement mitigation measures (discussed below in this Final EIS in Section 5.5, Construction Mitigations) to ensure that the construction process does not worsen air quality.

Noise and Vibration

Studies indicate that the operation of the Green Line will not result in vibration impacts provided that columns are located an adequate distance from sensitive buildings, as SMP proposes. Mitigation of potential vibration impacts resulting from construction is discussed below in this Final EIS in Section 5.5, Construction Mitigation. Operational noise impacts also may be avoided depending upon train car construction and location of the guideway. If noise impacts cannot be avoided, mitigation measures would include a variety of tools to shield stations and/or train cars, reduce speeds in sensitive areas, and/or shield sensitive buildings such as residences. Mitigation measures for noise impacts resulting from operation of the Green Line are discussed in Section 5.4.5. Mitigation measures for noise impacts resulting from construction are discussed in Section 5.5.

Energy

Mitigation measures related to energy use are discussed in Section 5.4.6 of this Final EIS. Appropriate and conservative use of energy by the Green Line is proposed to be achieved through incorporation of relevant City and State energy codes, as well as through electricity conservation measures.

Public Services and Utilities

Mitigation measures related to public services and utilities are discussed in Section 5.4.7 of this Final EIS. In this area, mitigation measures include strategies to:

- Minimize the impact of the Green Line on emergency response times;
- Maximize access to public services;
- Enhance public safety at stations and other Monorail facilities; and
- Minimize impacts to utilities during the construction process, and optimize coordination with the City and other utilities.

Parks and Recreation

Mitigation measures related to parks and recreation are discussed in Section 5.4.8 of this Final EIS. The Mitigation Program for parks and recreation includes strategies to minimize visual impacts to public parks and open spaces.

Cultural Resources

Mitigation measures for cultural resources to address impacts related to operation of the Green Line are discussed in Section 5.4.9 of this Final EIS. Additional mitigation measures related to construction are discussed in Section 5.5. Mitigation measures in this area include a number of alignment-wide strategies to identify and catalog archaeological and historical resources, as well as community-specific strategies that include:

- Development of a comprehensive program with research, Internet resources, and a professionally prepared tour of historic resources linked by the Green Line;
- Development of a Memorandum of Agreement with the State of Washington Historic Preservation Officer and City of Seattle Historic Preservation Officer.
- Monitoring during construction in potentially sensitive areas with specific procedures for treatment of any artifacts encountered; and preconstruction review of sensitive and extremely sensitive historic buildings with specific procedures for avoiding and addressing construction impacts. Mitigation of potential impacts related to construction is discussed below in Construction Mitigation, Section 5.5.

Environmental Health

Mitigation measures related to environmental health are discussed in Section 5.4.10 of this Final EIS. In this area, mitigation will focus on health and safety related to hazardous materials that may be exposed during construction or used during operation of the Green Line. Mitigation measures will include comprehensive identification, tracking, handling, and disposal of hazardous materials. Mitigation measures related to the identification and treatment of hazardous materials during construction is discussed below in Construction Mitigation, Section 5.5.

Earth

Mitigation measures related to earth are discussed in Section 5.4.11 of this Final EIS. Mitigation measures in this area will include adherence to seismic standards as well as minimization of landslide risk.

Water Quality

Mitigation measures related to water quality are discussed in Section 5.4.12 of this Final EIS. To preserve water quality, mitigation measures will include:

- Flow control mitigation per regulations; and
- Detention facilities as required per building codes
- Compliance with applicable water quality regulations.

Plants and Animals

Mitigation measures related to plants and animals are discussed in Section 5.4.13 of this Final EIS. Mitigation measures in this area will focus on restoring or replanting any displaced street trees, vegetation, or habitat. Particular focus will be on measures to minimize impacts to aquatic habitat during construction of the Ballard Crossing.

Cumulative Impacts

Mitigation measures related to cumulative impacts during construction are discussed in Section 5.5 of this Final EIS. SMP will work with other agencies to ensure that Green Line construction and operation is coordinated with other major projects throughout the region and that impacts are minimized.

Construction

Mitigation measures for impacts in all areas of the environment that could occur during construction are discussed in Section 5.5 of this Final EIS. Prior to and during construction, SMP will implement a number of mitigation measures to reduce the impacts of the construction process. Mitigation measures will include:

- Extensive and comprehensive outreach to nearby businesses and residents;
- Traffic control and traffic, pedestrian, and bus safety measures;
- Coordination with the City on needed lane closures and traffic rerouting;
- Air quality mitigation, including the use of low-sulfur fuels;
- Minimization of noise and vibration, access and visual impacts from construction activities and materials and phasing of construction to minimize impacts on businesses and residents;
- Comprehensive safety and quality control programs throughout the construction process;
- Stormwater and runoff controls and policies.

How will the Mitigation Program be Implemented?

The mitigation measures identified for the Green Line in the Mitigation Program will be implemented by SMP as the project is designed, constructed, and operated. These mitigation measures are now

incorporated into the definition of the project, and SMP will implement them, provide funding for their implementation, or ensure that other agencies fund and implement them (although this would not alleviate SMP's overall responsibility for implementation). SMP is prohibited from withdrawing or substantially changing any of the mitigation measures identified in the environmental record for the project without express written approval by relevant permitting agencies. In addition, any change to the project that may involve new or changed environmental or community impacts not yet considered in the existing environmental record must be reviewed in accordance with NEPA and SEPA environmental procedures.

1.16 WHAT IS SMP'S SUSTAINABILITY PROGRAM?

One of the early resolutions of the SMP Board was focused on enhancing the environmental sustainability of the Green Line (Resolution 03-34, April 2, 2003). The Board directed "staff, contractors and the public to identify and implement creative ways to increase the project's benefits to the quality of Seattle's environment." The SMP environmental sustainability program has involved early coordination with design and engineering leads for the Project, and extensive work with City Departments, outside experts and community resources to identify specific measures that go beyond environmental requirements or traditional mitigation. The sustainability program included a detailed design-focused workshop (co-sponsored by Seattle City Light). The program has led to identification of many environmental strategies and enhancements that will be required elements of the project (such as regenerative braking for the monorail trains). Other sustainability strategies will be part of the competitive process to select the contractor team that will design, build, operate and maintain the Green Line (the DBOM RFP). Under this RFP, the teams will be specifically required to propose creative solutions that enhance the inherent contribution of the project to the region's sustainability. The solutions will be scored based on the potential contribution of each idea to reducing waste, pollution or energy consumption.

SMP recently received a letter underscoring the importance of the Project and the sustainability program from a wide spectrum of leading environmental groups (including 1000 Friends of Washington, Washington Conservation Voters, Transportation Choices Coalition, Sustainable Northwest, Climate Solutions, Cascade Bicycle Club and Bicycle Alliance of Washington). The groups stressed the inherent environmental benefits that will come from the Monorail, and stated that the Project "is becoming a symbol for how construction and transportation projects can be accomplished with the ultimate adherence to sustainability principles." A copy of this letter is contained at Appendix DD, Public Involvement.

1.17 WHAT HAPPENS NEXT?

After this Final EIS is issued, the SMP Board of Directors will determine which combination of alignment, station, and facility alternatives and options for the Green Line should be carried forward for permitting and construction.

The Coast Guard, as part of its responsibilities under NEPA, will issue a record of decision (ROD) as part of its bridge permitting process. Timing of the ROD will depend upon the dates of bridge permitting, and notice of the ROD will be published in the Federal Register. The ROD will include the factors the Coast Guard considered in its decision, a determination that the requirements of NEPA have been fulfilled, a listing of the significant environmental impacts, and a record of the mitigation commitments SMP has made for the development of the project.

Table 1-2. Green Line Long-Term Operational Impacts in the Ballard Segment

The main differences in impacts are based on whether the alignment is on the west side of 15th Avenue NW (Alternative 1.1) or in the center of 15th Avenue NW (Alternative 1.2), and whether a single or double beam configuration is used.

Element of the Environment	Common to All Alternatives	Alternative-Specific Long-term Impacts or Benefits		
		Preferred Alternative		
		Alternative 1.1(s) - West Side of 15th with West Bridge 1.1.1	Alternative 1.1 - West Side of 15 th	Alternative 1.2 - Center of 15 th
Transportation	None of the alternatives in Ballard is expected to result in adverse impacts to traffic or transportation. All four Ballard Crossing options (West Bridge, West Bridge with single beam, Far West Bridge, and East Bridge) would meet or exceed vertical and horizontal clearances for navigable waterways.	The 15th Ave. NW/NW 80th Street intersection would operate at LOS F in 2020 (no action LOS E). Net parking loss: 54 spaces.	The 15th Ave. NW/NW 80th Street intersection would operate at LOS F in 2020 (no action LOS E). Net parking loss: 48 to 106 spaces for Alternative 1.1.1 and 58 to 116 for Alternative 1.1.2. With Alternative 1.1.2, vessel turning movements could be affected from the placement of one or more columns in the turning basin at Fishermen's Terminal.	Traffic and access impacts due to placement of columns in center left-turn lane. The following intersections would operate at LOS F in 2020: 15th Ave. NW/NW 85th Street (35.4 second delay increase over no action), 15th Ave. NW/NW 80th Street (no action LOS E), 15th Ave. NW/NW Market Street (34.5 second delay increase over no action). Net parking loss: 142 to 313 spaces.
Displacements and Relocation	Impacts from displacements would be mitigated through compensation and relocation assistance.	Eight commercial/industrial parcels displaced. Six households displaced.	Seven commercial/industrial parcels displaced. No households displaced.	Four households displaced. One commercial/industrial parcel displaced.
Land Use and Neighborhoods	Impacts to land use and neighborhoods in the Ballard Segment are primarily displacement- and construction-related and are not expected to be substantial for any of the alternatives.			
Economics and Employment	Operation of the Green Line is not expected to result in adverse impacts.	Thirteen businesses displaced (96 workers).	Eight to fifteen businesses displaced (52 to 93 workers).	No businesses displaced.

Table 1-2. Green Line Long-Term Operational Impacts in the Ballard Segment (continued)

Element of the Environment	Common to All Alternatives	Alternative-Specific Long-term Impacts or Benefits		
		Preferred Alternative		
		Alternative 1.1(s) - West Side of 15th with West Bridge 1.1.1	Alternative 1.1 - West Side of 15 th	Alternative 1.2 - Center of 15 th
Visual Quality and Aesthetics	Impacts in Ballard would be low to moderate. Visual impacts could result from station and guideway structures, removal of existing buildings, removal or trimming of existing street trees, and the addition of a new bridge crossing of the Lake Washington Ship Canal. Impacts could include view limitations; light, glare and shadow; and visual contrast between proposed development and commercial areas, public open spaces, and the waterfront along the Ship Canal and Salmon Bay.	Requires replacement of approximately 140 to 150 street trees.	The far west bridge alternative (1.1.2) would result in changes to the visual character of the Fishermen's Terminal area that would be perceived as significantly adverse to some viewers. Requires replacement of approximately 140 to 160 street trees.	Requires replacement of approximately 15 street trees.
Air Quality	No Green Line alternatives are expected to result in adverse air quality impacts.			
Noise and Vibration	No vibration impacts would be expected with any of the Green Line alternatives in Ballard.	Potentially significant noise impacts to approximately 29 residences; moderate noise impacts to approximately 24 residences.	Potentially significant noise impacts to approximately 110 residences; moderate noise impacts to approximately 100 residences.	Moderate noise impacts to approximately 20 residences.
Energy	No adverse impacts to energy resources are expected for any alternative in Ballard.			
Public Services and Utilities	No substantial long-term impacts to public services or utilities are expected. All alternatives would require some utility relocation during construction (see Table 1-9).	Elimination of one southbound and one northbound lane could increase emergency response times.	Elimination of one southbound and one northbound lane could increase emergency response times.	Center lane restrictions on 15 th Avenue NW due to column placement could increase emergency response time.
Parks and Recreation	Impacts to Baker Park, Ballard Swimming Pool, East Ballard P-Patch, and 14 th Avenue NW Boat Ramp are expected to be minimal over the long term. Access would be slightly improved.	No additional impacts.	No additional impacts.	The NW 65 th 2 (Center) station would have a greater effect on the Ballard Swimming Pool because the Green Line station would be closer to the pool.

Table 1-2. Green Line Long-Term Operational Impacts in the Ballard Segment (continued)

Element of the Environment	Common to All Alternatives	Alternative-Specific Long-term Impacts or Benefits		
		Preferred Alternative		
		Alternative 1.1(s) - West Side of 15th with West Bridge 1.1.1	Alternative 1.1 - West Side of 15 th	Alternative 1.2 - Center of 15 th
Cultural Resources	The Ballard Bridge would be adversely affected by alteration of the surrounding environment (new Green Line bridge). Visual impacts to the bridge and three other historic resources, including Mike's Chili Parlor.	Visual impact to five historic resources.	Visual impact to five historic resources.	Visual impact to four historic resources; isolation and change of surrounding environment for one historic resource.
Environmental Health	Potential impacts from contaminated sites could occur during construction without proper mitigation (see Table 1-9).			
Earth	The entire project area is in a seismically adverse zone. Soils near all Ballard Bridge alternatives may be susceptible to liquefaction in an earthquake.			
Water Quality	Water quality impacts to receiving water bodies resulting from operation of guideways and trains would be expected to be negligible.	Net decrease of 4,100 square feet of pollutant-generating impervious surface (PGIS).	Net decrease of 1,300 to 16,400 square feet of PGIS	Net decrease of 2,400 square feet of PGIS.
Plants and Animals	There are no significant adverse impacts anticipated to plants or animals from any of the alternatives, requiring appropriate engineering techniques. New bridge columns could slightly increase potential habitat for smallmouth bass. These impacts could be mitigated through column design or other measures. New bridge columns have the potential to reduce the portion of the Ship Canal available to Muckleshoot Tribe fishers.			

Source: Draft sections of Green Line Final EIS.

Table 1-3. Green Line Long-Term Operational Impacts in the Interbay/Magnolia Segment

The main differences in impacts are based on whether the alignment is on the west side or center of 15th Avenue W and Elliott Avenue (Alternative 2.1 takes the west side of 15th Avenue W and center of Elliott Avenue and Alternative 2.2 takes the center of 15th Avenue W and the west side of Elliott Avenue), whether a single or double beam configuration is used, and the location of the Dravus station.

Element of the Environment	Common to All Alternatives	Alternative-Specific Long-term Impacts or Benefits		
		Preferred Alternative Alternative 2.1 - West Side of 15 th /Center of Elliott	Alternative 2.1 and 2.1(s) - West Side of 15 th /Center of Elliott (with single beam)	Alternative 2.2 - Center of 15 th /West Side of Elliott
Transportation	No alternative is expected to result in adverse impacts to traffic or transportation.	Greater traffic and truck circulation and access impacts due to the placement of guideway columns in the center two-way turn lane on Elliott Avenue W. The following intersections would operate at LOS F in 2020: W Dravus Street/16th Ave. W (1.6 to 29.5 second delay increase over no action), 15th Ave. W/W Dravus Street northbound ramps (no action LOS E), 15th Ave. W/W Dravus Street southbound ramps (no action LOS E), Elliott Ave. W/W Mercer Place (no action LOS C). Net parking loss: 43 to 193 spaces.	Greater traffic and truck circulation and access impacts due to the placement of guideway columns in the center two-way turn lane on Elliott Avenue W. The following intersections would operate at LOS F in 2020: W Dravus Street/16th Ave. W (1.6 to 29.5 second delay increase over no action), 15th Ave. W/W Dravus Street northbound ramps (no action LOS E), 15th Ave. W/W Dravus Street southbound ramps (no action LOS E), Elliott Ave. W/W Mercer Place (no action LOS C). Net parking loss: 43 to 193 spaces for Alternative 2.1 and 75 to 177 spaces for Alternative 2.1(s).	Some traffic and truck circulation and access impacts due to the placement of the guideway columns in the center two-way turn lane on 15th Avenue W; however, 15th Avenue W has fewer critical access points that would be affected than Elliott Avenue W. The following intersections would operate at LOS F in 2020: W Dravus Street/16th Ave. W (>42.9 second delay increase over no action), 15th Ave. W/W Dravus Street northbound ramps (no action LOS E), 15th Ave. W/W Dravus Street southbound ramps (no action LOS E). Net parking loss: 41 to 43 spaces.
Displacements and Relocation	Impacts from displacements would be mitigated through compensation and relocation assistance.	Four commercial/industrial parcels displaced; seven households displaced.	Four to five full commercial/industrial parcels displaced; seven households displaced.	Six commercial/industrial parcels displaced; one public/institutional parcel displaced; no households displaced.
Land Use and Neighborhoods	Impacts to land use and neighborhoods in the Interbay Segment are primarily displacement- and construction-related and are not expected to be substantial for any of the alternatives. The redevelopment likely to occur is consistent with local land use plans for the area.			

Table 1-3. Green Line Long-Term Operational Impacts in the Interbay/Magnolia Segment (continued)

Element of the Environment	Common to All Alternatives	Alternative-Specific Long-term Impacts or Benefits		
		Preferred Alternative Alternative 2.1 - West Side of 15 th /Center of Elliott	Alternative 2.1 and 2.1(s) - West Side of 15 th /Center of Elliott (with single beam)	Alternative 2.2 - Center of 15 th /West Side of Elliott
Economics and Employment	Operation of the Green Line is not expected to result in significant unavoidable adverse impacts.	Four businesses displaced (85 workers).	Two to five businesses displaced (23-123 workers).	Six businesses displaced (53-79 workers).
Visual Quality and Aesthetics	Impacts in Interbay would be low for all alternatives. The height, scale, and broad linear visual elements of the Green Line columns, guideway, and stations would not contrast strongly with the existing visual character of existing visual features in this segment.	Requires replacement of approximately 120 street trees.	Requires replacement of approximately 120 street trees.	Requires replacement of approximately 15 street trees.
Air Quality	No Green Line alternatives are expected to result in adverse air quality impacts.			
Noise and Vibration	No vibration or noise impacts would be expected with any of the Green Line alternatives in Interbay.			
Energy	No adverse impacts to energy resources are expected for any alternative.			
Public Services and Utilities	All alternatives could increase emergency response time by eliminating a travel lane and restricting use of a center lane for a portion of the alignment. All alternatives would require some utility relocation during construction (see Table 1-9).			
Parks and Recreation	Access would increase slightly. Visual impacts to parks within sight of station alternatives could be mitigated through appropriate design of facilities, including landscaping, special signage, lighting, and access.	Similar, but somewhat reduced visual impacts and shadow impacts compared to Alternative 2.2 because 2.1 is in the center of Elliott Avenue.	Similar, but somewhat reduced visual impacts and shadow impacts compared to Alternative 2.2 because 2.1 is in the center of Elliott Avenue. The visual setting and access for the Interbay Athletic Complex and Interbay P-Patch may be altered more for Alternative 2.1 than for 2.2.	Similar, but somewhat greater visual impacts and shadow impacts compared to Alternative 2.1 because 2.2 is on the west side of Elliott Avenue.

Table 1-3. Green Line Long-Term Operational Impacts in the Interbay/Magnolia Segment (continued)

Element of the Environment	Common to All Alternatives	Alternative-Specific Long-term Impacts or Benefits		
		Preferred Alternative Alternative 2.1 - West Side of 15 th /Center of Elliott	Alternative 2.1 and 2.1(s) - West Side of 15 th /Center of Elliott (with single beam)	Alternative 2.2 - Center of 15 th /West Side of Elliott
Cultural Resources	Impacts to cultural resources would largely be visual.	Adverse visual effects to seven buildings, isolation/alteration impacts to two historic properties, and demolition of the Tsubota Steel and Pipe Building.	Alternative 2.1 would result in adverse visual impacts to six historic resources and displace two residences because the Green Line would pass over and potentially acquire the properties. The Tsubota Steel and Pipe Building would be demolished.	Alternative 2.2 would result in an adverse visual impact to six historic resources.
Environmental Health	Long-term and operational environmental health impacts for the Green Line are limited to maintenance activities that would occur at the Operations Center (see Table 1-8). Potential impacts from contaminated sites could occur during construction without proper mitigation (see Table 1-9).			
Earth	General seismic hazards that apply to the entire Green Line, liquefaction of loose material, landfill debris, steep slopes, and landslides could affect all alternatives in Interbay.			
Water Quality	Water quality impacts to receiving water bodies resulting from operation of guideways and trains would be expected to be negligible.	Net decrease of 22,400 square feet of PGIS.	Net decrease of 4,600 to 41,800 square feet of PGIS.	Net decrease of 20,900 to 30,200 square feet of PGIS.
Plants and Animals	No impacts to plants and animals expected with any of the alternatives.			

Source: Draft sections of Green Line Final EIS.

Table 1-4. Green Line Long-Term Operational Impacts in the Queen Anne/Seattle Center/Belltown Segment

The main differences in impacts are based on (1) whether the alignment travels through the Seattle Center (Alternatives 3.1 and 3.3) or around the Seattle Center (Alternatives 3.2 and 3.5), and (2) whether the Green Line replaces the existing Monorail in a center of Fifth Avenue alignment (Alternatives 3.1, 3.3, and 3.5) or in a west side of Fifth Avenue alignment (Alternative 3.2).

Element of the Environment	Alternative-Specific Long-term Impacts or Benefits					
	Common to All Alternatives	Preferred Alternative Alternative 3.1/3.2	Alternative 3.1 - Seattle Center/ Republican	Alternative 3.2 - Mercer	Alternative 3.3 - Thomas	Alternative 3.5 - Second/Denny
Transportation	No significant unavoidable adverse traffic, access, or parking impacts are expected with any of the alternatives in this segment.	Net parking loss: 116 to 118 spaces.	Net parking loss: 122 to 152 spaces.	Net parking loss: 84 to 119 spaces.	Net parking loss: 159 to 182 spaces.	The Denny Way/Broad Street intersection would operate at LOS F in 2020 (no action LOS D). Net parking loss: 220 spaces.
Displacements and Relocation	Impacts from displacements would be mitigated through compensation and relocation assistance.	Four commercial/industrial parcels displaced; no households displaced.	Twelve commercial/industrial parcels displaced; 29 households displaced.	Nine commercial/industrial parcels displaced; 29 households displaced.	Eleven commercial/industrial parcels displaced; no households displaced.	Three commercial/industrial parcels displaced; one public/institutional parcel displaced; no households displaced.
Land Use and Neighborhoods	Impacts to land use and neighborhoods in this segment not expected to be substantial for any of the alternatives.	Station at Northwest Rooms compatible with current public use. Route through Seattle Center grounds could affect pedestrian choke points but would not interfere with public use or festivals.	Station at Northwest Rooms compatible with current public use. Route through Seattle Center grounds could affect pedestrian choke points but would not interfere with public use or festivals.	Station at Northwest Rooms compatible with current public use.	Station southwest of Key Arena would be compatible with public use but would replace current supporting activities. Route through Seattle Center grounds would not interfere with public use or festivals.	Station southwest of Key Arena would be compatible with public use but would replace current supporting activities. Loss of parking for Pacific Science Center would be an adverse impact, but partially offset by station at Broad Street.

Table 1-4. Green Line Long-Term Operational Impacts in the Queen Anne/Seattle Center/Belltown Segment (continued)

Element of the Environment	Alternative-Specific Long-term Impacts or Benefits					
	Common to All Alternatives	Preferred Alternative Alternative 3.1/3.2	Alternative 3.1 - Seattle Center/ Republican	Alternative 3.2 - Mercer	Alternative 3.3 - Thomas	Alternative 3.5 - Second/Denny
Economics	Operation of the Green Line is not expected to result in adverse economic impacts.	Four businesses displaced (61 workers).	Three to eleven businesses displaced (68 to 146 workers).	Four to twelve businesses displaced (109 to 183 workers).	Eleven to fourteen businesses displaced (126 to 151 workers).	Fourteen to seventeen businesses displaced (117 to 142 workers).
Visual Quality and Aesthetics	Impacts would be moderate to high for all alternatives. Street trees would be trimmed and/or replaced for all alternatives. The Green Line would be visible from several key viewpoints but would not block views. The visual impact from trains passing overhead is expected to vary with the observer and the setting, but could be greater for gatherings that are contemplative or quiet.	Requires replacement of up to 150 street trees.	Requires replacement of up to 150 street trees.	Visual impacts would be greater if the existing Monorail's columns and guideways are retained (Alternative 3.2.2) than if they are removed (Alternative 3.2.1). Requires replacement of approximately 80 to 110 street trees.	Requires replacement of approximately 135 to 140 street trees.	Requires replacement of approximately 78 to 88 street trees.
Air Quality	No Green Line alternatives are expected to result in adverse air quality impacts.					

Table 1-4. Green Line Long-Term Operational Impacts in the Queen Anne/Seattle Center/Belltown Segment (continued)

Element of the Environment	Alternative-Specific Long-term Impacts or Benefits					
	Common to All Alternatives	Preferred Alternative Alternative 3.1/3.2	Alternative 3.1 - Seattle Center/ Republican	Alternative 3.2 - Mercer	Alternative 3.3 - Thomas	Alternative 3.5 - Second/Denny
Noise and Vibration		No vibration impacts are expected. Potentially significant noise impacts to approximately 26 residences.	No vibration impacts are expected. Potentially significant noise impacts to approximately 26 residences.	One sensitive receiver could be impacted by vibration. Placing columns a minimum of 20 feet from the face of the building would avoid this impact. Potentially significant noise impacts to approximately 34 residences. Moderate impact to Seattle Center near Northwest Rooms.	No vibration impacts are expected. Potentially significant noise impacts to approximately 26 residences. Moderate impact to church and school.	No vibration impacts are expected. Potentially significant noise impacts to approximately 26 residences. Moderate impact to church.
Energy	No adverse impacts to energy resources are expected for any alternative.					
Public Services and Utilities	No substantial long-term impacts to public services or utilities are expected. The Green Line would benefit some public services such as Center High School by providing enhanced access. All alternatives would require some utility relocation during construction (see Table 1-9).	Elimination of one travel lane on Fifth Avenue could increase emergency response times.	No additional impacts.	With Alternative 3.2, elimination of one travel lane on Fifth Avenue could increase emergency response times.	No additional impacts.	Elimination of one eastbound travel lane on Denny could increase emergency response times.

Table 1-4. Green Line Long-Term Operational Impacts in the Queen Anne/Seattle Center/Belltown Segment (continued)

Element of the Environment	Alternative-Specific Long-term Impacts or Benefits					
	Common to All Alternatives	Preferred Alternative Alternative 3.1/3.2	Alternative 3.1 - Seattle Center/ Republican	Alternative 3.2 - Mercer	Alternative 3.3 - Thomas	Alternative 3.5 - Second/Denny
Parks and Recreation	Impacts on Tilikum Place would be less if the Green Line replaced the existing Monorail. Operation of the two lines together would increase noise and visual impacts on the park.	Fewer impacts on Tilikum Place because the existing Monorail would not be replaced.	Fewer impacts on Tilikum Place because the existing Monorail would not be replaced.	Impacts on Tilikum Place would be greater with Alternative 3.2.2 that would retain the existing Monorail than with Alternative 3.2.1.	Fewer impacts on Tilikum Place because the existing Monorail would not be replaced.	Fewer impacts on Tilikum Place because the existing Monorail would not be replaced.
Cultural Resources		Adverse visual effects on an apartment building, the Seattle Center House, and Memorial Stadium. Demolition of the Monorail Terminal, Office, and Track located in Seattle Center.	Would adversely affect the most historic resources (two demolitions and three visual impacts).	One demolition and three visual impacts to historic resources. Option 3.2.1 may also demolish the Monorail Terminal Office and Track System; Option 3.2.2 would preserve both but have visual impacts on the guideway.	One demolition and three visual impacts to historic resources.	Three visual impacts to historic resources.
Environmental Health	Potential impacts from contaminated sites could occur during construction without proper mitigation (see Table 1-9).					
Earth	The entire project area is in a seismically adverse zone.	Liquefaction zone present. Steep slope near Memorial Stadium.	Liquefaction zone present. Steep slope near Memorial Stadium.	Liquefaction zone present.		
Water Quality	Water quality impacts to receiving water bodies resulting from operation of guideways and trains would be expected to be negligible.	Net decrease of 18,700 square feet of PGIS.	Net decrease of 18,700 to 34,800 square feet of PGIS.	Net decrease of 18,700 to 25,800 square feet of PGIS.	Net decrease of 42,500 to 58,600 square feet of PGIS.	Net decrease of 30,100 to 43,000 square feet of PGIS.

Table 1-4. Green Line Long-Term Operational Impacts in the Queen Anne/Seattle Center/Belltown Segment (continued)

Element of the Environment	Alternative-Specific Long-term Impacts or Benefits					
	Common to All Alternatives	Preferred Alternative Alternative 3.1/3.2	Alternative 3.1 - Seattle Center/ Republican	Alternative 3.2 - Mercer	Alternative 3.3 - Thomas	Alternative 3.5 - Second/Denny
Plants and Animals	All alternatives would replace street trees on W Harrison Street.	Would replace some vegetation on Seattle Center grounds.	Would replace some vegetation on Seattle Center grounds.	Would replace some vegetation around Seattle Center grounds.	Would replace some vegetation on Seattle Center grounds.	

Source: Draft sections of Green Line Final EIS.

Table 1-5. Green Line Long-Term Operational Impacts in the Downtown/Pioneer Square Segment

The main differences in impacts are based on whether the alignment is on the west side (Alternative 4.1), east side (Alternative 4.2), center (Alternative 4.3) or east of center (Alternative 4.4) of Second Avenue and the location of the Pike station.

Element of the Environment	Common to All Alternatives	Alternative-Specific Long-term Impacts or Benefits				
		Preferred Alternative Alternative 4.1	Alternative 4.1 - West Side of Second	Alternative 4.2 - East Side of Second With Crossover	Alternative 4.3 - Center of Second	Alternative 4.4 - East Center of Second
Transportation	With the exception of the parking impacts on Second Avenue, no significant unavoidable adverse impacts on transportation are expected with any of the alternatives in this segment.	Smoothest traffic flow, although vehicles attempting to park on the west side of the street would need to cross over the bus lane. Net parking loss: 492 spaces (185 on-street and 307 off-street).	Smoothest traffic flow, although vehicles attempting to park on the west side of the street would need to cross over the bus lane. Net parking loss: 467 to 544 spaces (185 on-street and 282 to 359 off-street).	Impacts to traffic flow at crossover location south of Marion Street, as all lanes would shift and straddle bent columns would be used. Net parking loss: 622 spaces (122 on-street and 500 off-street).	More potential for access and circulation impacts than Alternatives 4.1 or 4.2 because the guideway would be placed in the center of Second Avenue, which would prohibit vehicles from passing between columns to change lanes. Greatest impact to bicycle facilities due to removal of the bicycle lane on the east side of Second Avenue. Net parking loss: 1,179 to 1,240 spaces (236 on-street and 943 to 1,004 off-street).	More potential for access and circulation impacts than Alternatives 4.1 and 4.2 because the guideway would be placed in the center of Second Avenue, which would prohibit vehicles from passing between columns to change lanes. Greatest impact to bicycle facilities due to removal of the bicycle lane on the east side of Second Avenue. Greatest net loss of parking spaces: 683 spaces (236 on-street and 447 off-street).
Displacements and Relocation	Impacts from displacements would be mitigated through compensation and relocation assistance.	Six commercial/ industrial parcels displaced; one public/institutional; no households displaced.	10 commercial/ industrial parcels displaced; one public/institutional parcel displaced; no households displaced.	Nine commercial/ industrial parcels displaced; 56 households displaced.	12 commercial/ industrial parcels displaced; one public/institutional parcel displaced; no households displaced.	Six commercial/ industrial parcels displaced; 56 households displaced.

Table 1-5 Green Line Long-Term Operational Impacts in the Downtown/Pioneer Square Segment (continued)

Element of the Environment	Common to All Alternatives	Alternative-Specific Long-term Impacts or Benefits				
		Preferred Alternative Alternative 4.1	Alternative 4.1 - West Side of Second	Alternative 4.2 - East Side of Second With Crossover	Alternative 4.3 - Center of Second	Alternative 4.4 – East Center of Second
Land Use and Neighborhoods	Impacts to land use and neighborhoods in the Downtown Segment are primarily displacement- and construction-related and are not expected to be substantial for any of the alternatives.	Stations would be compatible with surrounding uses and would provide improved access to nearby activities.	Stations would be compatible with surrounding uses and would provide improved access to nearby activities.	Stations would be compatible with surrounding uses and would provide improved access to nearby activities.	Loss of Bon Marche parking garage would be an adverse impact to the Downtown retail core. Guideway and station locations in the center of Second Avenue would be generally less compatible with surrounding existing or planned uses.	Loss of Bon Marche parking garage would be an adverse impact to the Downtown retail core. Guideway and station locations in the center of Second Avenue would be generally less compatible with surrounding existing or planned uses.
Economics and Employment	Operation of the Green Line is not expected to result in adverse economic impacts.	Eight businesses displaced (228 workers).	Eight to 21 businesses including one public entity displaced (203 to 253 workers). The Fifth and Stewart and Pike station alternatives account for the wide variation in possible displacements.	Ten businesses displaced (31 to 51 workers).	Twenty-one businesses displaced (244 workers).	Nine businesses displaced (49 workers)
Visual Quality and Aesthetics	All alternatives would have a high visual impact because they would visually affect up to 81 historic resources and notable buildings such as Benaroya Hall. Guideways would be partially visible from Occidental Park and Pioneer Square, and would change the character of Second Avenue.	Requires replacement of approximately 57 street trees. Transition to horizontal reduces some view impacts.	Requires replacement of approximately 57 street trees.	More shading of open spaces and plazas on east side of Second Avenue than other alternatives. Requires replacement of approximately 80 to 85 street trees.	Additional impacts due to station structures straddling Second Avenue. Requires replacement of approximately 21 street trees.	More shading of open spaces and plazas on east side of Second Avenue than Alternatives 4.1 or 4.3. Requires replacement of approximately 21 street trees.

Table 1-5 Green Line Long-Term Operational Impacts in the Downtown/Pioneer Square Segment (continued)

Element of the Environment	Common to All Alternatives	Alternative-Specific Long-term Impacts or Benefits				
		Preferred Alternative Alternative 4.1	Alternative 4.1 - West Side of Second	Alternative 4.2 - East Side of Second With Crossover	Alternative 4.3 - Center of Second	Alternative 4.4 - East Center of Second
Air Quality	No Green Line alternatives are expected to result in adverse air quality impacts.					
Noise and Vibration	Vibration levels would be below limits with any of the alternatives.	Potentially significant noise impacts to approximately 30 residences.	Potentially significant noise impacts to approximately 30 residences.	Potentially significant impacts to approximately 12 residences. Moderate impact outside Benaroya Hall.	No noise impacts.	Potentially significant impacts to approximately 12 residences. Moderate impact outside Benaroya Hall.
Energy	No adverse impacts to energy resources are expected for any of the alternatives.					
Public Services and Utilities	All alternatives would eliminate one travel lane on Stewart, however no substantial long-term impacts to public services are expected. All alternatives would require utility relocation during construction (see Table 1-9).	No additional impacts.	No additional impacts.	The crossover location south of Marion Street, which would shift all lanes of traffic, could increase emergency response times.	The placement of the guideway columns down the center of Second Avenue could increase emergency response times.	The placement of the guideway columns down the center of Second Avenue could increase emergency response times.
Parks and Recreation	Access to parks in the Downtown Segment would be enhanced.	Development of the Sinking Ship garage into a Green Line station could enhance Pioneer Square Park's surroundings.	Development of the Sinking Ship garage into a Green Line station could enhance Pioneer Square Park's surroundings.	Development of the Sinking Ship garage into a Monorail station could enhance Pioneer Square Park's surroundings.	Would not have the benefit of redeveloping the Sinking Ship Garage.	Development of the Sinking Ship garage into a Monorail station could enhance Pioneer Square Park's surroundings.

Table 1-5 Green Line Long-Term Operational Impacts in the Downtown/Pioneer Square Segment (continued)

Element of the Environment	Common to All Alternatives	Alternative-Specific Long-term Impacts or Benefits				
		Preferred Alternative Alternative 4.1	Alternative 4.1 - West Side of Second	Alternative 4.2 - East Side of Second With Crossover	Alternative 4.3 - Center of Second	Alternative 4.4 - East Center of Second
Cultural Resources	New construction of the Green Line could have significant unavoidable adverse effects by altering the character of the setting of historical resources and the visual character of Pioneer Square Historic District. Some of these effects could be mitigated or minimized through creative design solutions or off-site mitigation.	Adverse visual effects to 84 historic resources. The Federal Reserve Building and the Sinking Ship Garage areaway would be demolished.	Adverse visual impacts to 84 historic resources and demolition of up to three historic resources.	Adverse visual impacts to 81 historic resources.	Adverse visual impacts to 79 historic resources and demolition of up to two historic resource.	Adverse visual impacts to 81 historic resources.
Environmental Health	Potential impacts from contaminated sites could occur during construction without proper mitigation (see Table 1-9).					
Earth	The entire project area is in a seismically adverse zone. Liquefaction zones are a concern for all alternatives.					
Water Quality	No Downtown station alternatives would add any pollutant generating impervious surface to any existing sites. Water quality impacts to receiving water bodies resulting from operation of guideways and trains would be expected to be negligible.	Net decrease of 41,700 square feet of PGIS.	Net decrease of 41,700 to 55,000 square feet of PGIS.	Net decrease of 48,000 square feet of PGIS.	Net decrease of 28,200 to 44,200 square feet of PGIS.	Net decrease of 45,200 square feet of PGIS.
Plants and Animals	With the exception of some street trees and shrubbery, no habitat supporting fish, wildlife, or vegetation occurs along the Downtown Segment with any of the Green Line alternatives.					

Source: Draft sections of Green Line Final EIS.

Table 1-6. Green Line Long-Term Operational Impacts in the SODO/Chinatown International District/Pioneer Square Segment

The main differences in impacts are based on whether the alignment is on the east (Alternative 5.1) or west side (Alternative 5.2) of Third Avenue S, whether a single or double beam configuration is used, and the alignment and station location in the Lander area.

Element of the Environment	Common to All Alternatives	Alternative-Specific Long-term Impacts or Benefits		
		Preferred Alternative Alternative 5.2(s) - West Side of Third/Utah	Alternative 5.1 - East Side of Third/Utah	Alternative 5.2 - West Side of Third/Utah
Transportation	No significant unavoidable adverse impacts to traffic, access, or parking are expected with any of the alternatives in the SODO Segment. Truck circulation impacts are not expected to be significant with any alternative.	Net parking loss: 194 spaces (57 on-street and 137 off-street).	Greater impacts to access and circulation, since the guideway would be placed along a greater number of streets. Net parking loss: 185 to 337 spaces (88 to 109 on-street and 97 to 228 off-street). Alternative 5.1.2 (along the east side of Third Avenue S and on First Avenue S between S Lander and S Horton Streets) would have the greatest potential for truck circulation impacts based on the alignment's proximity to major truck routes and loading docks.	Net parking loss: 153 spaces (52 on-street and 101 off-street).
Displacements and Relocation	Impacts from displacements would be mitigated through compensation and relocation assistance.	Six commercial/industrial parcels displaced; no households displaced.	Four commercial/industrial parcels displaced; no households displaced.	Six commercial/industrial parcels displaced; no households displaced.
Land Use and Neighborhoods	Impacts to land use and neighborhoods in the SODO Segment are primarily displacement- and construction-related and are not expected to be substantial for either of the alternatives.	More potential for column placement to affect adjacent businesses; could be mitigated.	Less potential for column placement to affect adjacent businesses; impacts could be mitigated.	More potential for column placement to affect adjacent businesses; could be mitigated.
Economics and Employment	Operation of the Green Line is not expected to result in significant adverse economic impacts.	Five businesses displaced (38 workers).	One to four businesses displaced (20 to 392 workers).	Five businesses displaced (38 workers).

Table 1-6. Green Line Long-Term Operational Impacts in the SODO/Chinatown International District/Pioneer Square Segment (continued)

Element of the Environment	Common to All Alternatives	Alternative-Specific Long-term Impacts or Benefits		
		Preferred Alternative Alternative 5.2(s) - West Side of Third/Utah	Alternative 5.1 - East Side of Third/Utah	Alternative 5.2 - West Side of Third/Utah
Visual Quality and Aesthetics	Impacts to visual resources would be associated with visual contrast and view obstruction near the south edge of Pioneer Square Historic District and the area around King Street Station, removal of buildings, addition of station structures and the Operations Center south alternative, and the presence of the elevated guideway structure.	Requires replacement of approximately 10 to 15 street trees.	Requires replacement of approximately 20 to 30 street trees.	Requires replacement of approximately 10 to 15 street trees.
Air Quality	No Green Line alternatives are expected to result in adverse air quality impacts.			
Noise and Vibration	Vibration levels would be below limits for both alternatives. There are no sensitive receptors for noise along any alignment alternative in SODO.			
Energy	No adverse impacts to energy resources are expected for any alternative.			
Public Services and Utilities	All alternatives would require some utility relocation during construction (see Table 1-9).	No substantial long-term impacts to public services are expected.	The elimination of a travel lane with Alternative 5.1.2 could increase emergency service response time, however no substantial long-term impacts to public services are expected.	No substantial long-term impacts to public services are expected.
Parks and Recreation	Union Station Square, Fortson Square, and Washington Square could experience some visual impacts with all alternatives.			
Cultural Resources		Adverse visual impacts to two historic resources.	Adverse visual impacts to two historic resources.	Adverse visual impacts to three historic resources.
Environmental Health	Long-term and operational environmental health impacts for the Green Line are limited to maintenance activities that would occur at the Operations Center, if the SODO (C-2) alternative is selected (see Table 1-8). Potential impacts from contaminated sites could occur during construction without proper mitigation (see Table 1-9).			

**Table 1-6. Green Line Long-Term Operational Impacts in the SODO/Chinatown International District/Pioneer Square Segment
(continued)**

Element of the Environment	Common to All Alternatives	Alternative-Specific Long-term Impacts or Benefits		
		Preferred Alternative Alternative 5.2(s) - West Side of Third/Utah	Alternative 5.1 - East Side of Third/Utah	Alternative 5.2 - West Side of Third/Utah
Earth	The entire project area is in a seismically adverse zone. Liquefaction zones are a concern for all alternatives, requiring appropriate engineering treatment.			
Water Quality	Water quality impacts to receiving water bodies resulting from operation of guideways and trains would be expected to be negligible.	Net decrease of 167,300 square feet of PGIS.	Net decrease of 146,500 to 221,900 square feet of PGIS.	Net decrease of 167,300 square feet of PGIS.
Plants and Animals	With the exception of some street trees and shrubbery, no habitat supporting fish, wildlife, or vegetation occurs along the SODO Segment with any of the Green Line alternatives.			

Source: Draft sections of Green Line Final EIS.

Table 1-7. Green Line Long-Term Operational Impacts in the West Seattle Segment

The main differences in impacts are based on (1) the alignment crossing the Duwamish Waterway on the West Seattle Bridge or a new bridge; (2) the alignment and station location in Delridge; (3) the alignment and station location in the Avalon area; (4) the alignment traveling down the center of California Avenue (Alternative 6.1), west side (Alternative 6.1.6), or east side (Alternative 6.2); (5) the location of the Morgan Junction station; and (6) the use of a single or double beam configuration.

Element of the Environment	Common to All Alternatives	Alternative-Specific Long-term Impacts or Benefits					
		Preferred Alternative	Alternative 6.1 - West Seattle I	Alternative 6.2 - West Seattle II	Alternative 6.3(s) - Delridge North Subsegment	Alternative 6.4 and 6.4(s) - Andover/Yancy Subsegment	Alternative 6.5 - Genesee Subsegment
Transportation	No significant unavoidable adverse impacts to traffic, access, or parking are expected with any of the alternatives in this segment. Impacts to navigation on the Duwamish Waterway are not expected for either alternative because all structures would meet or exceed the applicable vertical and horizontal clearances and no new structures are proposed in water. With close coordination with other users of the waterway, no significant impediments to navigation from construction are anticipated from either alternative.	Guideway columns in the center of Avalon Way SW would have some potential for access and circulation impacts. Net parking loss: 251 to 276 spaces (Delridge subsegment: 0 to 25 spaces).	Guideway columns in the center left turn lane of California Avenue SW and center of Avalon Way SW would affect left turn movements. Traffic impacts on Fauntleroy Way SW. Net parking loss: 297 to 482 spaces (Delridge subsegment: 176 to 201 spaces).	Guideway columns in the center of Avalon Way SW and SW Alaska Street would have access impacts in that portion of West Seattle. 6.2.1 would place columns on the north side of SW Alaska Street. 6.2.2 would place columns in the center of 35th Ave. SW, which could restrict access. Net parking loss: 363 to 384 spaces (Delridge subsegment: 120 to 141 spaces).	Net parking loss: approximately 0 to 25 spaces	Net parking loss: 230 to 251 spaces for 6.4 and 85 to 106 spaces for 6.4(s).	Net parking loss: approximately 84 to 94 spaces
Displacements and Relocation	Impacts from displacements would be mitigated through compensation and relocation assistance.	Six commercial/industrial parcels displaced.	Eleven commercial/industrial parcels displaced; three households displaced.	Six commercial/industrial parcels displaced; three households displaced.	No parcels displaced.	Two commercial/industrial parcels displaced; two households displaced.	Three commercial/industrial parcels displaced; eight households displaced.

Table 1-7. Green Line Long-Term Operational Impacts in the West Seattle Segment (continued)

Element of the Environment	Common to All Alternatives	Alternative-Specific Long-term Impacts or Benefits					
		Preferred Alternative	Alternative 6.1 - West Seattle I	Alternative 6.2 - West Seattle II	Alternative 6.3(s) - Delridge North Subsegment	Alternative 6.4 and 6.4(s) - Andover/Yancy Subsegment	Alternative 6.5 - Genesee Subsegment
Land Use and Neighborhoods	Impacts to land use and neighborhoods in the West Seattle Segment are primarily displacement- and construction-related. Residents would benefit from improved transit access.	Reduced access and parking along California Avenue SW could have slight impact to adjacent uses.	Reduced access and parking along California Avenue SW could have slight impact to adjacent uses.	Less impact to access and parking along California Avenue SW and adjacent uses. Greater parking loss with more potential to affect adjacent businesses.	Low land use and neighborhood impacts in the Delridge area.	Low land use and neighborhood impacts in the Delridge area.	Displacements and visual/scale impacts would negatively affect the character of the area.
Economics and Employment	Construction and operation of the Green Line is not expected to result in adverse economic impacts.	Four businesses displaced (31 workers).	Eleven businesses displaced (63 to 81 workers).	Three to four businesses displaced (17 workers).	No businesses displaced.	No businesses displaced.	Five businesses displaced (16 workers).

Table 1-7. Green Line Long-Term Operational Impacts in the West Seattle Segment (continued)

Element of the Environment	Common to All Alternatives	Alternative-Specific Long-term Impacts or Benefits					
		Preferred Alternative	Alternative 6.1 - West Seattle I	Alternative 6.2 - West Seattle II	Alternative 6.3(s) - Delridge North Subsegment	Alternative 6.4 and 6.4(s) - Andover/Yancy Subsegment	Alternative 6.5 - Genesee Subsegment
Visual Quality and Aesthetics	Impacts to the West Seattle Bridge area would be low to moderate, for the SW Yancy Street-SW Avalon Way area would be moderate, and for California Avenue SW would be moderate-high. Visual impacts could result from the introduction of station and guideway structures and removal of existing buildings. Impacts could include view limitations, light, glare and shadow, and visual contrast between proposed development and commercial areas, residential neighborhoods, and a park.	The addition of a single-beam guideway structure atop the existing West Seattle Bridge would have visual impacts, but fewer than with the dual beam. The Delridge 3 (Nucor) station would have low visual impacts. Requires replacement of approximately 100 street trees.	The Delridge 1 (26 th) station would have moderate to high visual impacts on the Longfellow Creek Greenspace. The addition of a guideway structure atop the existing West Seattle Bridge would have visual impacts. Requires replacement of approximately 90 to 100 street trees.	The addition of a new bridge spanning the Duwamish Waterway would have visual impacts. The Delridge 2 (Andover) station would have moderate to high visual impacts on the Longfellow Creek Greenspace. Requires replacement of approximately 120 to 180 street trees.	The Delridge 3 (Nucor) station would have low visual impacts. Requires replacement of approximately 50 to 60 street trees.	The Delridge 1A (Delridge/Andover) station would have moderate to high visual impacts on the Longfellow Creek Greenspace. Requires replacement of approximately 80 to 90 street trees.	The Delridge 4 (Genesee) station would have low to moderate visual impacts. Requires replacement of approximately 90 to 100 street trees.
Air Quality	No Green Line alternatives are expected to result in adverse air quality impacts.						

Table 1-7. Green Line Long-Term Operational Impacts in the West Seattle Segment (continued)

Element of the Environment	Common to All Alternatives	Alternative-Specific Long-term Impacts or Benefits					
		Preferred Alternative	Alternative 6.1 - West Seattle I	Alternative 6.2 - West Seattle II	Alternative 6.3(s) - Delridge North Subsegment	Alternative 6.4 and 6.4(s) - Andover/Yancy Subsegment	Alternative 6.5 - Genesee Subsegment
Noise and Vibration	Vibration levels would be below limits for either alternative.	Potentially significant impacts to approximately 116 residences; moderate impacts to approximately 63 residences.	Potentially significant impacts to approximately 313 residences. With Alternative 6.1.6, there would be approximately 234 residences impacted.	Potentially significant noise impacts to approximately 296 residences; moderate impacts to approximately 12 residences.	No noise impacts predicted for Delridge residences.	No noise impacts predicted for Delridge residences.	Potentially significant noise impacts to approximately 31 residences in Delridge.
Energy	No adverse impacts to energy resources are expected for any alternative.						
Public Services and Utilities	No substantial long-term impacts to public services are expected. The Green Line would benefit some public services, such as the Delridge Community Center, by providing enhanced access. All alternatives would require some utility relocation during construction (see Table 1-9).	The elimination of the center turn lane on Avalon Way SW could increase emergency response times.	The elimination of the center turn lanes on Avalon Way SW and California Avenue SW could increase emergency response times.	The elimination of the center turn lane on Avalon Way SW could increase emergency response times.	No additional impacts.	No additional impacts.	No additional impacts.

Table 1-7. Green Line Long-Term Operational Impacts in the West Seattle Segment (continued)

Element of the Environment	Common to All Alternatives	Alternative-Specific Long-term Impacts or Benefits					
		Preferred Alternative	Alternative 6.1 - West Seattle I	Alternative 6.2 - West Seattle II	Alternative 6.3(s) - Delridge North Subsegment	Alternative 6.4 and 6.4(s) - Andover/Yancy Subsegment	Alternative 6.5 - Genesee Subsegment
Parks and Recreation	Impacts to the Eddy Street Ravine open space would be low. Access to parks and open spaces would improve with the Green Line.	Lower visual impacts to Longfellow Creek Greenspace because the station is located east of the steel plant. The Avalon 2B station would not affect West Seattle Stadium Park. Avalon 2B would not require removal of any trees.	Alternative 6.1.2 could affect the West Duwamish Greenbelt at Pigeon Point from the placement of structural supports on steep slopes at Pigeon Point and ongoing trimming of trees and vegetation. The Longfellow Creek Greenspace near the Delridge station could experience visual and other impacts from increased traffic and transit activity, vegetation removal, and shading. Alternatives 6.1.3 and 6.1.4 could have low-level noise, visual, shading, and access impacts on Fauntleroy Place.	The Longfellow Creek Greenspace near the Delridge station could experience visual and other impacts from increased traffic and transit activity, vegetation removal, and shading. The Avalon 2 and 2A stations would occupy a small area on the west end of the West Seattle Stadium Park, which would require removal of trees and specific mitigation. Avalon 2B would not require removal of any trees.	No impacts to parks and recreation. Guideway does not cross over Longfellow Creek Greenspace.	Lower visual impacts to Longfellow Creek Greenspace because the station is entirely in the parking lot east of the creek and the guideways would be over the culvert at the north-most end of the buffer.	Removal of street trees required near Delridge playfields, but would not block any views north to the neighborhood. Views from the West Seattle Golf Course would be altered, but not blocked.

Table 1-7. Green Line Long-Term Operational Impacts in the West Seattle Segment (continued)

Element of the Environment	Common to All Alternatives	Alternative-Specific Long-term Impacts or Benefits					
		Preferred Alternative	Alternative 6.1 - West Seattle I	Alternative 6.2 - West Seattle II	Alternative 6.3(s) - Delridge North Subsegment	Alternative 6.4 and 6.4(s) - Andover/Yancy Subsegment	Alternative 6.5 - Genesee Subsegment
Cultural Resources		Adverse visual impacts to eleven historic resources.	Adverse visual impacts to nine historic resources.	Adverse visual impacts to ten historic resources.	Isolation/alteration of Nucor Steel Plant. Adverse visual impacts to three historic resources.	Adverse visual impacts to Nucor Steel Plant.	Adverse visual impacts to Cooper School.
Environmental Health	Potential impacts from contaminated sites could occur during construction without proper mitigation (see Table 1-9).						
Earth	The entire project area is in a seismically adverse zone. Liquefaction zones are a concern for all alternatives, requiring appropriate engineering techniques. Seismically induced landslides are a greater concern for Alternative 6.1.2 due to the proximity of Pigeon Point.						
Water Quality	Water quality impacts to receiving water bodies resulting from operation of guideways and trains would be expected to be negligible.	Net decrease of 48,200 square feet of PGIS.	Net decrease of 50,700 to 51,900 square feet of PGIS.	Net decrease of 44,900 to 58,800 square feet of PGIS.	Net decrease of 20,000 square feet of PGIS (Delridge Station only).	Net increase of 1,800 square feet of PGIS (Delridge Station only).	Net decrease of 5,200 square feet of PGIS (Delridge Station only).

Table 1-7. Green Line Long-Term Operational Impacts in the West Seattle Segment (continued)

Element of the Environment	Common to All Alternatives	Alternative-Specific Long-term Impacts or Benefits					
		Preferred Alternative	Alternative 6.1 - West Seattle I	Alternative 6.2 - West Seattle II	Alternative 6.3(s) - Delridge North Subsegment	Alternative 6.4 and 6.4(s) - Andover/Yancy Subsegment	Alternative 6.5 - Genesee Subsegment
Plants and Animals		Vegetation and wildlife at Pigeon Point would not be affected. No impacts to Longfellow Creek Greenspace.	Operation of Green Line Alternative 6.1.2 would reduce vegetation at Pigeon Point. Construction of the guideway and Delridge 1 Station adjacent to Longfellow Creek Greenspace may cause impacts that would require specific mitigation.	Construction of a new bridge over the Duwamish could affect tribal fisheries operations if not mitigated. Operation of Green Line Alternative 6.2 is not expected to affect vegetation and wildlife. Construction of the guideway and Delridge 2 Station adjacent to Longfellow Creek Greenspace may cause impacts that would require specific mitigation.	Guideway does not cross over and no station would be constructed near the Longfellow Creek Greenspace.	Guideway crosses over the parking lot east of Longfellow Creek and the guideways would be over the culvert at the north-most end of the buffer.	Guideway crosses over Longfellow Creek Greenspace on an earthen dam.

Source: Draft sections of Green Line Final EIS.

Table 1-8. Green Line Operations Center Impacts

Element of the Environment	Common to All Alternatives	Alternative-Specific Impacts or Benefits	
		Interbay Operations Center	SODO Operations Center
Transportation	No substantial traffic or access impacts are expected. No adverse impacts to freight railroad activity are expected with either of the Operations Center sites.		
Displacements and Relocation	In addition to the displacements listed by alternative, acquisitions are needed for facilities such electrical substations and train storage tracks (zero to 12 full commercial/industrial parcels). Impacts from displacements would be mitigated through relocation using SMP's relocation assistance policy.	Up to two commercial/industrial parcels displaced.	Up to six commercial/industrial parcels displaced.
Land Use and Neighborhoods	An Operations Center in either the Interbay or SODO Segments would be compatible with the existing uses in those neighborhoods and with underlying zoning.		
Economics	No adverse impacts to the local or regional economy are expected.	Eight businesses displaced (187 workers).	Six businesses displaced (496 workers).
Visual Quality and Aesthetics		Low visual quality impacts for the Interbay site.	Low visual quality impacts for the SODO site.
Air Quality	No adverse impacts to air quality are expected from the Green Line or either Operations Center alternative.		
Noise and Vibration	No noise or vibration impacts are expected for either alternative.		
Energy	No substantial impacts to energy resources are expected with either Operations Center site.		
Public Services and Utilities	No substantial long-term impacts to public services or utilities are expected.		
Parks and Recreation		Impacts on parks and recreational resources in the vicinity of the Interbay Operations Center site (Southwest Queen Anne Greenbelt and Kinnear Park) are expected to be minimal.	No impacts to parks and recreational resources are expected.
Cultural Resources		One building associated with the WWII Smith Cove Naval Depot would be demolished.	No impacts to historic resources are expected.

Table 1-8. Green Line Operations Center Impacts (continued)

Element of the Environment	Common to All Alternatives	Alternative-Specific Impacts or Benefits	
		Interbay Operations Center	SODO Operations Center
Environmental Health	Maintenance of the Green Line would require use of hazardous materials at the Operations Center. Good design and standard operating practices would minimize any likelihood of release to the environment.		
Earth	General seismic hazards that apply to the entire Green Line could affect an Operations Center in Interbay or SODO.	No additional earth impacts are expected with the Interbay Operations Center.	Liquefaction zones could affect the Operations Center in SODO. The Seattle Fault zone crosses the south end of the SODO Operations Center.
Water Quality	All industrial activities would be enclosed and not exposed to stormwater.	Net decrease of 89,900 square feet of PGIS.	Net decrease of 27,500 square feet of PGIS.
Plants and Animals	No habitat supporting fish, wildlife, or vegetation occurs in the vicinity of either site.		

Source: Draft sections of Green Line Final EIS.

Table 1-9 Green Line Construction Impacts

Impacts related to construction of the Green Line are discussed in Section 4.17, Construction. A brief summary of impacts by subject is provided below. Please refer to Section 4.17 for a more detailed description of construction impacts. Except as noted below, the construction impacts are not expected to vary significantly by geographical segment or alternative.

Element of the Environment	General and Segment-Specific Construction Impacts
Transportation	With mitigation, transportation impacts from construction of the Green Line would not be significant for any of the alternatives. All alternatives would require temporary lane or street closures, which would lead to parking loss and increased truck and detoured traffic along the Green Line alignment, on arterial streets, in station areas, and in staging areas. Alternatives with center alignments (1.2, 2.1 [southern portion], 2.2 [northern portion], 4.3, 4.4, and 6.1) would generally require one additional lane over alternatives with side alignments. Removal of the existing Monorail would likely require temporary, full closures of the affected sections of Fifth Avenue. Barges and/or work platforms used for construction of the bridge elements could temporarily interfere with marine navigation in the waterways. This would be mitigated by consultation with the Coast Guard on appropriate work windows. On the West Seattle Bridge (Alternative 6.1), one lane in each direction would be closed during construction. Temporary bus route relocation may be required. Without coordination, Green Line construction over the BNSF main line could create rail transportation delays. Mitigation measures for transportation impacts are discussed in Chapter 5.
Displacements and Relocations	Displacements for construction-related activities with any of the alternatives would not be significant if mitigation measures are implemented. Property needs for construction and operation of the Green Line alternatives are discussed in Section 4.2, Displacements and Relocation. Construction contractors could require construction staging areas outside of the properties evaluated in Section 4.2. Construction staging areas are described in Section 4.17.1.6 and 4.17.2.1. Up to 15 parcels could be required for temporary staging. Impacts from displacements would be mitigated through relocation, as discussed in Section 4.2, Displacements and Relocation.
Land Use and Neighborhoods	Construction impacts to land use and neighborhoods are not expected to be significant for any of the alternatives. Direct construction impacts include short-term use of property for construction, traffic congestion, access restriction, increased dust and noise, construction lighting, utility disruptions, and parking loss. Construction of the Green Line could temporarily affect land uses at the Seattle Center. Alternative 3.1 would have the greatest effect, followed by Alternative 3.3. Potential impacts and mitigation to land use and neighborhoods during construction are discussed in Section 4.17.4. Mitigation measures are discussed in Chapter 5.
Economics and Employment	With mitigation, potentially significant economic impacts related to Green Line station and alignment construction activities could be reduced, minimizing potential loss of revenue and jobs at some businesses. Possible impacts are described in Section 4.17.2 and 4.17.5 and could include: disruption of transit routes or stops, impacts to truck access for deliveries, loss of on- or off-street parking, increased congestion, and full to partial street and sidewalk closures or detours. These impacts could occur for any Green Line alignment alternative in areas with business activity and similar mitigation measures apply to all alternatives. Both direct and indirect economic benefits could occur to the local economy as money used for construction circulates and creates job opportunities and demand for goods and services. Mitigation measures are discussed in Chapter 5.
Visual Quality and Aesthetics	Visual impacts during construction of any of the alternatives would not be significant if mitigation measures are implemented. Temporary visual impacts would occur during construction, such as visibility of construction activity, signage, equipment, lighting, and materials; removal of trees and vegetation; obstruction of views; and change of visual character of construction areas. Light shielding and other mitigation measures for visual quality are discussed in Chapter 5.
Air Quality	With mitigation, construction-related air quality impacts would not be significant for any of the alternatives. Temporary air quality impacts could result from dust and construction equipment and vehicle emissions generated during construction. SMP is working with the Puget Sound Clean Air Agency to evaluate potential approaches to construction mitigation measures, as discussed in more detail in Chapter 5.

Table 1-9. Green Line Construction Impacts (continued)

Element of the Environment	General and Segment-Specific Construction Impacts
Noise and Vibration	Construction equipment and activities could cause noise and vibration impacts to nearby residential and commercial uses. Historic buildings and areaways in the Downtown Segment would be particularly sensitive to vibration caused by pile driving. Mitigation measures, such as monitoring and inspection during construction and the use of alternative construction techniques to reduce vibration impacts, are discussed in Chapter 5.
Energy	Energy would be consumed to construct the Green Line, but is not expected to have significant, adverse effects on the local power supply. Construction energy use is discussed in Section 4.17.9.
Public Services and Utilities	Construction activities could cause short-term increases in emergency service response times and could temporarily affect access to Ballard High School (particularly Alternative 1.2), Seattle Maritime Academy (Alternative 1.2), and Center High School (Alternative 3.3) in the short term. Construction of any Green Line alternative would require utility relocation. Mitigation measures have been identified in Section 4.17.10 and are discussed in Chapter 5 to enhance mobility and limit service disruptions. Notable utility relocations include: Ballard Segment: Alternative 1.2 (Center of 15th) is expected to have more utility relocation impacts than Alternatives 1.1/1.1(s) (West Side of 15th(single beam)). Alternative 1.1/1.1(s) could require relocation of 2,000 lineal feet of storm drain and sewer and more than 8,000 feet of overhead power line. Alternative 1.2 could require relocation of 5,200 feet of sewer line, over 5,000 feet of water main, 750 feet of natural gas line, and approximately 6,000 feet of overhead power line. Interbay Segment: Alternative 2.1/2.1(s) (West of 15th/Center of Elliott(single beam)) is expected to have more utility relocation impacts than Alternative 2.2 (Alternative 2.2 would have more utilities to relocate, but the magnitude of the relocations for Alternative 2.1/2.1(s) is anticipated to result in greater impacts.) Alternative 2.1/2.1s could require relocation of 4,600 feet of storm drain and sewer, 1,200 feet of underground duct bank, and 12,000 feet of overhead power lines. Alternative 2.2 could require relocation of 1,800 feet of storm drain and sewer, 800 feet of water line, 10,000 feet of natural gas line, 500 feet of underground duct bank, and 10,900 feet of overhead power lines. Queen Anne/Seattle Center/Belltown Segment: All alternatives in this segment are expected to have similar impacts. Different alternatives would require relocation of different types of utilities, but overall the impacts are expected to be similar. Alternative 3.1 (Seattle Center/Republican) could require relocation of 2,240 feet of storm drain and sewer, 495 feet of underground duct banks, and 2,200 feet of overhead power lines. Alternative 3.2 (Mercer) would require relocation of significantly less storm drain and sewer (165 lineal feet) and overhead power lines (545 feet) than other alternatives in this segment, but could require relocation of over 1,200 feet of water main, and 3,030 feet of underground duct bank. Alternative 3.3 (Thomas) could require relocation of 2,680 feet of storm drain and sewer, 1,115 feet of natural gas line, and 2,200 feet of overhead power line. Alternative 3.5 (Second/Denny) would require relocation of 3,300 feet of storm drain and sewer and 2,200 feet of overhead power line. Downtown Segment: Alternative 4.2 (East Side of Second with Crossover) is anticipated to have the greatest utility relocation impacts in this segment. Alternative 4.1 could require the relocation of 2,000 feet of natural gas line as well as 240 underground distribution segments for power and telecommunications (most impacts to the utility duct bank could be mitigated by locating column foundations so as to avoid the duct bank). Alternative 4.2 could require the relocation of 2,190 feet of 20" water main. Alternative 4.3 (Center of Second) would not attempt to relocate the sewer tunnel underneath Second Avenue but would have to use special straddle foundations for support columns, and would require other sewer and steam relocations. Alternative 4.4 (East Center of Second) utility impacts would be similar to those for Alternative 4.2 (East Side of Second) with the exception that it would greatly minimize impacts to water mains and underground electrical duct banks.

Table 1-9. Green Line Construction Impacts (continued)

Element of the Environment	General and Segment-Specific Construction Impacts
	SODO Segment: Utility relocation impacts in the SODO Segment are expected to be similar for any alternative. Any of the alternatives could require relocation of between 1,000 and 1,500 feet of storm drain and sewer, 1,300 to 1,400 feet of water main, 500 feet of underground power, and 5,200 to 6,000 feet of overhead power. West Seattle Segment: Utility relocation impacts in the West Seattle Segment are expected to be similar for any alternative, except in the Delridge subsegment, where the impacts for Alternatives 6.4, 6.4(s), and 6.5 are lower. Alternatives 6.1 (West Seattle I) and 6.3 (Delridge North single beam) could require relocation of 5,300 feet of sewer, 7,400 feet of water line, 550 feet of natural gas line, and 13,000 feet of overhead power line. Alternative 6.2 (West Seattle II) could require relocation of 4,000 feet of storm drain and sewer, 5,600 feet of water line, 1,300 feet of natural gas line, and 15,000 feet of overhead power line. Alternatives 6.4/6.4(s) (Andover/Yancy Subsegment (single beam)) and 6.5 (Genesee Subsegment) greatly reduce impacts to sewers.
Parks and Recreation	Temporary noise, visual, air quality, and transportation impacts could occur during construction to the following parks and recreational facilities: Baker Park, Ballard Swimming Pool (mainly Alternative 1.2), Greg's Garden, and 14th Avenue NW Boat Ramp in Ballard; the Interbay Athletic Complex, Interbay P-Patch, Southwest Queen Anne Greenbelt, and Kinnear Park in Interbay; Tilikum Place in the Queen Anne/Seattle Center/Belltown Segment (especially with a guideway on the west side of Fifth Avenue); Union Station Square, Pioneer Square Park, Westlake Park, and Occidental Park in the Downtown Segment; and West Duwamish Greenbelt (Alternative 6.1.2), Longfellow Creek (Alternative 6.1), West Seattle Stadium Park (Alternative 6.2), and Fauntleroy Place (Alternative 6.1) in West Seattle. If the Avalon 2A station site is selected (it is not the Preferred Alternative), construction will occur in the West Seattle Stadium Park. Mitigation for construction impacts to these facilities is discussed in Section 4.17.11.
Cultural Resources	No significant impacts to archaeological or historic resources are expected if mitigation measures are implemented. Hunter-fisher-gatherer or ethnographic period and/or historic period archaeological resources may occur on the former shorelines of Salmon Bay, Smith Cove, and Elliott Bay; near the Elliott Avenue terrace; in the vicinity of Fifth and Broad, Pike, Madison, Yesler, Weller/King Street, Delridge, Avalon, Alaska Junction, and Morgan Junction stations; on the former tideflats of Elliott Bay; on the north end of Pigeon Point (Alternative 6.1.2); and in the lower reach of the Longfellow Creek drainage (Alternative 6.1). Impacts to archaeological resources could be avoided and/or mitigated by preparing monitoring and treatment plans. Historic resources, especially in the Downtown Segment, could experience temporary construction impacts due to demolition; utility relocation; increased vibration, traffic, noise, and dust; and access restrictions. Monitoring for structural and vibration effects to historical resources during construction could determine if mitigation is required. The use of vibratory pile drivers or an auger to install the piles, rather than pile driving, could greatly reduce vibration levels. Impacts and mitigation for cultural resources are discussed further in Section 4.17.12.

Table 1-9. Green Line Construction Impacts (continued)

Element of the Environment	General and Segment-Specific Construction Impacts
Environmental Health	With mitigation, no significant environmental health impacts are expected for any of the alternatives. Contaminated soils may be encountered at various upland sites during the construction of the project, but would be avoided to the extent possible. Contamination on SMP-acquired property would be managed in accordance with applicable regulations. Each segment would have a number of hazardous materials release sites on or near the Green Line. In Ballard, the Preferred Alternative would have 13 sites, Alternative 1.1.1 would have 13 sites, Alternative 1.1.2 would have 11 sites, and Alternative 1.2 would have 16 sites. In Interbay, the Preferred Alternative would have 35 sites, Alternatives 2.1.2 and 2.1.2 would have 35 to 44 sites, and Alternative 2.2 would have 39 sites. In the Queen Anne/Seattle Center/Belltown Segment, the Preferred Alternative would have 23 sites, Alternative 3.1 would have 16 to 19 sites, Alternative 3.2 would have 22 sites, Alternative 3.3 would have 14 sites, and Alternative 3.5 would have 18 sites. In the Downtown Segment, all alternatives would have 21 sites. In SODO, the Preferred Alternative would have 44 sites, Alternative 5.1 would have 44 to 45 sites, and Alternative 5.2 would have 40 sites. In West Seattle, the Preferred Alternative would have 40 sites, Alternative 6.1 would have 46 sites and Alternative 6.2 would have 42 sites. In the Delridge area of West Seattle Alternative 6.3 would have 7 sites, Alternative 6.4 would have 9 sites, and Alternative 6.5 would have 6 sites. Temporary sediment and erosion control Best Management Practices would be used to prevent contaminated soils from being washed offsite during soil excavation and removal activities. Impacts and mitigation for environmental health are discussed further in Section 4.17.13.
Earth	Construction activities would not cause significant earth impacts if mitigation measures are implemented. Construction impacts to earth could include vibration and settlement, erosion, dewatering, excavation, and soil disposal. Mitigation measures to reduce or avoid impacts to earth are described in Section 4.17.14.
Water Quality	With mitigation, no significant impacts to water quality are expected for any of the alternatives. Construction activities have the potential to adversely affect receiving water bodies if sediment-laden water or other contaminants leave the construction area. Construction near or over the Ship Canal, Duwamish Waterway, and Longfellow Creek (Alternatives 6.1, 6.2, and 6.4) would be the areas of greatest concern. Potential construction impacts would be mitigated by implementation of Best Management Practices, as discussed in Section 4.17.15.
Plants and Animals	If mitigation measures are implemented, no significant impacts to plants and animals are expected with any of the alternatives. Construction of the Green Line across the Lake Washington Ship Canal and Duwamish Waterway has the potential to impact salmon. SMP has initiated coordination with native tribes interested in salmon habitat and fishing issues, and will continue coordinating closely with these tribes as well as appropriate state and federal agencies. Removal of street trees and vegetation would occur in places along areas of the alignment, particularly W Harrison Street (all alternatives) and the Seattle Center grounds (Alternatives 3.1 and 3.3). Mitigation would include replacement with appropriately sized street trees and vegetation. Construction of Green Line could affect vegetation and wildlife at Pigeon Point (Alternative 6.1.2) and Longfellow Creek (6.1, 6.2, and 6.4). Mitigation to improve habitat function and replace vegetation is discussed in more detail in Section 4.17.16.

Source: Draft sections of Green Line Final EIS.